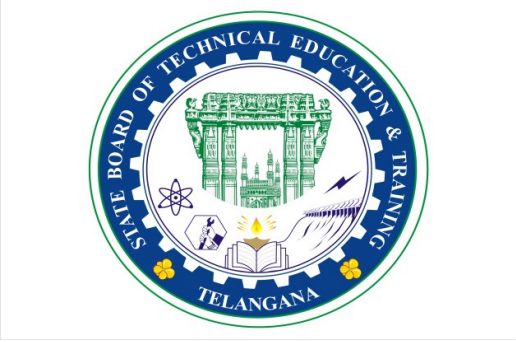
DRAFT CURRICULUM – 2016
(C-16)

DIPLOMA IN
CIVIL ENGINEERING



State Board of Technical Education & Training
Telangana State
HYDERABAD

CURRICULUM (C-16)
FOR DIPLOMA COURSES IN TELANGANA

I. PREAMBLE

The State Board of Technical Education and Training, **Telangana** under the aegis of the Department of Technical Education, Telangana generally reviews the Curricula to tune up the updated development both in academic and industry side. However, recognizing the changing needs as stated by the user industries, the Board has decided to bring forward the revision of curriculum. Consequently the Board with the assistance of senior faculty the concerned branches performed the evaluation of C-14 Curriculum in force. On finding the merits and demerits of C-14 Curriculum the faculty have made a thorough assessment of the curricular changes that have to be brought in. It was felt that there is an urgent need to improve hands-on experience among the students pursuing diploma courses. Further, the urgency of enhancing communication skills in English was also highlighted in the feedback and suggestions made by the user industries. Keeping these in view, a number of meetings and deliberations were held at state level, with experts from industry, academia and senior faculty of the department. The new Curricula for the different diploma courses have been designed with the active participation of the members of the faculty teaching in the Polytechnics of Telangana, besides reviewed by Expert Committee constituted with eminent academicians.

The primary objective of the curricular change is to produce best technicians in the country by correlating growing needs of the industries with the academic input.

The revised New Curriculum i.e., Curriculum – 2016 or C-16 is planned and designed duly introducing 6 months industrial training in 3rd year level (5th or 6th semester) to have good exposer with industries and it will be implemented from the academic year 2016-17.

Salient Features:

1. Duration of course is either 3 years / 3½ years duration of Regular Academic Instruction.

2. The Curriculum is prepared in Semester Pattern. However, First Year is maintained as Year-wise pattern.

3. The policy decisions taken at the State and Central level with regard to environmental science are implemented by including relevant topics in Chemistry. This is also in accordance with the Supreme Court guidelines issued in Sri Mehta's case.

4. Keeping in view the increased need of communication skills which is playing a major role in the success of Diploma Level students in the Industries, emphasis is given for learning and acquiring listening, speaking, reading and writing skills in English. Further as emphasized in the meetings, Communication Skills lab and Life Skills lab are introduced in III and IV semesters respectively for all the branches.

5. Modern topics relevant to the needs of the industry and global scenario suitable to be taught at Diploma level are also incorporated in the curriculum.

6. CAD specific to the branch has been given more emphasis in the curriculum. Preparing drawings using CAD software has been given more importance.

7. Every student is exposed to the computer lab at the 1st year itself in order to familiarize himself with skills required for keyboard/mouse operation, internet usage and e-mailing.

8. The number of teaching hours allotted to a particular topic/chapter has been rationalized keeping in view the past experience

9. Upon reviewing the existing C-14 curriculum, more emphasis is given to the practical content of Laboratories and Workshops, thus strengthening the practical skills.

10. With increased emphasis for the student to acquire Practical skills, the course content in all the subjects is thoroughly reviewed and structured as outcome based than the conventional procedure based. While the course content in certain subjects is reduced, in rest of the subjects the content has been enhanced as per the need.

11. All Practical subjects are independent of each other and the practice of grouping two or more practical subjects is dispensed with.

12. Curricula of Laboratory and Workshops have been thoroughly revised based on the suggestions received from the industry and faculty, for better utilization of the equipment available at the Polytechnics. The experiments /exercises that are chosen for the practical sessions are identified to conform to the field requirements of industry.

13. The Members of the working group are grateful to Dr.M.V.Reddy, I.A.S., Director of Technical Education & Chairman, S.B.T.E.T. for his constant guidance and valuable inputs in revising, modifying and updating the curriculum.

14. The Members acknowledge with thanks the cooperation and guidance provided by the Sri. D. Venkateswarlu, Secretary, SBTET, Telangana and other officials of Directorate of Technical Education and the State Board of Technical Education, Telangana, experts from industry, academia from the universities and higher learning institutions and all teaching fraternity from the Polytechnics who are directly and indirectly involved in preparation of the curricula.

II. RULES AND REGULATIONS

1. ADMISSION PROCEDURES:

1.1 DURATION AND PATTERN OF THE COURSES

All the Diploma programs run at various institutions are of AICTE approved 3 years or 3½ years duration of Academic Instruction.

All the Diploma courses are run on year wise pattern in the First year, and the remaining two or two & half years are run in the semester pattern. In respect of few courses, the training will be in the seventh semester.

1.2 PROCEDURE FOR ADMISSION INTO THE DIPLOMA COURSES:

Selection of candidates is governed by the Rules and regulations laid down in this regard from time to time.

i) Candidates who wish to seek admission in any of the Diploma courses will have to appear for Common Entrance Test for admissions into Polytechnics (POLYCET) conducted by the State Board of Technical Education and Training, Telangana, Hyderabad.

Only the candidates satisfying the following requirements will be eligible to appear for the Common Entrance Test for admissions into Polytechnics (POLYCET).

a) The candidates seeking admission should have appeared for the X class examination, conducted by the Board of Secondary Examination, Telangana or equivalent examination thereto, at the time of making application to the Common Entrance Test for Polytechnics for admissions into Polytechnics (POLYCET). In case of candidates who apply pending results of their qualifying examinations, their selection shall be subject to production of proof of their passing the qualifying examination in one attempt or compartmentally at the time of interview for admission.

b) Admissions are made based on the merit obtained in the Common Entrance Test (POLYCET) and the reservation rules stipulated by the Government of Telangana from time to time.

c) For admission into the following Diploma Courses for which entry qualification is 10+2, candidates need not appear for POLYCET. A separate notification will be issued for admission into these courses.

1). D.H.M.C.T. 2). D.Pharmacy

1.3 MEDIUM OF INSTRUCTION

The medium of instruction and examination shall be English.

1.4 PERMANENT IDENTIFICATION NUMBER (PIN)

A cumulative / academic record is to be maintained of the Marks secured in sessional work and end examination of each year for determining the eligibility for promotion etc., a Permanent Identification Number (PIN) will be allotted to each candidate so as to facilitate this work and avoid errors in tabulation of results.

1.5 NUMBER OF WORKING DAYS PER SEMESTER / YEAR:

a). The Academic year for all the Courses usually shall be from June 2nd week of the year of admission to the 31st March of the succeeding year.

b). The Working days in a week shall be from Monday to Saturday

c). There shall be 7 periods of 50 minutes duration on all working days.

d). The minimum number of working days for each semester / year shall be 90 / 180 days excluding examination days. If this prescribed minimum is not achieved due to any reason, special arrangements shall be made to conduct classes to cover the syllabus.

1.6 ELIGIBILITY OF ATTENDANCE TO APPEAR FOR THE END EXAMINATION

a). A candidate shall be permitted to appear for the end examination in all subjects, if he or she has attended a minimum of 75% of working days during the year/Semester.

b). Condonation of shortage of attendance in aggregate upto 10% (65% and above and below 75%) in each semester or 1st year may be granted on medical grounds.

c). Candidates having less than 65% attendance shall be detained.

d). Students whose shortage of attendance is not condoned in any semester / 1st year are not eligible to take their end examination of that class and their admissions shall stand cancelled. They may seek re-admission for that semester / 1st year when offered next.

e). A stipulated fee shall be payable towards condonation for shortage of attendance.

1.7 READMISSION

Readmission shall be granted to eligible candidates by the respective RJD / Principal.

1) Within 15 days after commencement of class work in any semester (Except industrial Training).

2) Within 30 days after commencement of class work in any year (including D. Pharmacy course or first year course in Engineering and Non Engineering Diploma streams).

Otherwise such cases shall not be considered for readmission for that semester / year and are advised to seek readmission in the next subsequent eligible academic year.

The percentage of attendance of the readmitted candidates shall be calculated from the first day of begining of the regular class work for that year / Semester, as officially announced by CTE/SBTET but not form the day on which he/she has actually reported to the class work, after readmission is granted.

2. SCHEME OF EXAMINATION

21 a) First Year

THEORY EXAMINATION: Each Subject carries 80% marks with examination of 3 hours duration,

along with 20% marks for internal evaluation. (Sessional marks). However, there are no minimum marks prescribed for sessionals.

PRACTICAL EXAMINATION: There shall be 40% Marks for regular practical work done, i.e. sessional marks for each practical subject with an end examination of 3 hours duration carrying 60% marks. However, there are no minimum marks prescribed for sessionals.

b) III, IV, V and VI Semesters:

THEORY EXAMINATION: Each subject carries usually 80 marks and 40 marks in respect of specified subjects of 3hours duration, along with 20/ 10 marks for internal evaluation (sessional marks) respectively.

PRACTICAL EXAMINATION: Each subject carry 30/60 marks of 3hours duration 20/40 sessional marks.

22 **INTERNAL ASSESSMENT SCHEME**

a) Theory Subjects: Theory Subjects carry 20 % sessional marks, Internal examinations will be conducted for awarding sessional marks on the dates specified. **Three unit tests will be conducted for I year students and two Unit Tests for semesters.** Average of marks obtained in all the prescribed tests will be considered for awarding the sessional marks.

b) Practicals: Student's performance in Laboratories / Workshop shall be assessed during the year of study for 40% marks in each practical subject. Allotment of marks should be discrete taking into consideration of the students skills, accuracy, recording and performance of the task assigned to him / her. Each student has to write a record / log book for assessment purpose. In the subject of Drawing, which is also considered as a practical paper, the same rules hold good. Drawing exercises are to be filed in seriatum.

c) Internal assessment in Labs / workshops / Survey field etc., during the course of study shall be done and sessional marks shall be awarded by the concerned Lecturer / Senior Lecturer / Workshop superintendent as the case may be.

d) For practical examinations, except in drawing, there shall be two examiners. External examiner shall be appointed by the Principal in consultation with respective head of the department preferably choosing a person from an Industry. Internal examiner shall be the person concerned with internal assessment as in (c) above. The end examination shall be held along with all theory papers in respect of drawing.

e) Question Paper for Practicals: Question paper should cover all the experiments / exercise prescribed.

f) Records pertaining to internal assessment marks of both theory and practical subjects are to be maintained for official inspection.

g) **Evaluation and assessment of industrial training**, shall be done and marks be awarded in the following manner.

Industrial assessment	:	200 marks (in two spells of 100 marks each)
Maintenance of log book	:	30 marks
Record Work	:	30 marks
Seminar / viva-voce	:	40 marks
TOTAL	:	300 marks

The assessment at the institute level will be done by a minimum of three members Internal Faculty, Industrial Experts and H.O.D. and be averaged.

2.3 MINIMUM PASS MARKS

THEORY EXAMINATION:

For passing a theory subject, a candidate has to secure a minimum of 35% in end examination and a combined minimum of 35% of both Sessional and end examination marks put together.

PRACTICAL EXAMINATION:

For passing a practical subject, a candidate has to secure, a minimum of 50% in end examination and a combined minimum of 50% of both sessional and practical examination marks put together. In case of D.C.C.P., the pass mark for typewriting and short hand is 45% in the end examination. There are no sessional marks for typewriting and Shorthand subjects of D.C.C.P course.

2.4 PROVISION FOR IMPROVEMENT

1. Improvement is allowed only after he / she has completed all the subjects from First Year to Final semester of the Diploma.
2. Improvement is allowed in any 4 (Four) subjects of the Diploma.
3. The student can avail of this improvement chance only once, that too within the succeeding two examinations after the completion of Diploma, with the condition that the duration including Improvement examination shall not exceed FIVE years from the first admission.
4. No improvement is allowed in Practical / Lab subjects or Project work or Industrial Training assessment. However, improvement is allowed in drawing subject.
5. If improvement is not achieved, the marks obtained in previous Examinations hold good.
6. Improvement is not allowed in respect of the candidates who are punished under Mal-practice in any Examination.
7. Examination fee for improvement shall be paid as per the notification issued by State Board of Technical Education and Training from time to time.
8. All the candidates who wish to appear for improvement of performance shall deposit the original Marks Memos of all the years / Semesters and also original Diploma Certificate to the Board. If there is improvement in performance of the current examination, the revised Memorandum of marks and Original Diploma Certificate will be issued else the submitted originals will be returned.

3 RULES OF PROMOTION TO NEXT LEVEL :

3.1 For Diploma Courses (Except HMCT, Architecture, Chemical-Sugar & Auto mobile Engineering) From 1ST YEAR TO 3,rd, 4,th 5th , 6th and 7th Semesters:

1. A candidate shall be permitted to appear for first year examination provided he / she puts in 75% attendance and pays the examination fee. However, he/she can be condoned on Medical grounds upto 10% (i.e. attendance after condonation on Medical grounds should not be less than 65%) and he/she has to pay the condonation fee along with examination fee.
2. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the first year and pays the examination fee. A candidate who could not pay the first year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.
3. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pays the examination fee. A candidate who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.

   A candidate is eligible to appear for the 4th semester exam if he/she

   Puts the required percentage of attendance in the 4th semester
4. A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee on fulfilment of 3(i)(ii) clauses stated above. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

   A candidate is eligible to appear for the 5th semester exam if he/she

i) Puts the required percentage of attendance in the 5th semester

ii) Should not have failed in more than 6 subjects of 1st year, 3rd & 4th semesters put together.

For IVC students.

i) Puts the required percentage of attendance in the 5th semester

ii) Should not have failed in more than Four backlog subjects of III & IV Semesters

5. A candidate shall be promoted to 6th semester provided he/she has puts the required percentage of attendance in the 5th semester and pay the examination fee, a candidate who could not pay the 5th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 6th semester.

A candidate is eligible to appear for 6th semester examination if he/she

i) Puts the required percentage of attendance in 6th semester

For IVC students

i) Puts the required percentage of attendance in the6th semester

ii) Should have completed the Industrial Training.

iii) Should not have failed in more than Four backlog subjects of III, IV & V Semester put together.

3.2 For HMCT, Architecture and Chemical - Sugar courses

1) The same rules are applicable on par with other diploma courses with the exception that the Industrial Training is in the 5th semester.

2) A candidate shall be promoted to 5th semester (Industrial Training) provided he/she puts the required percentage of attendance in the 4th semester and pay the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by the SBTET from time to time before commencement of 5th semester (Industrial Training).

3) A candidate shall be promoted to 6th semester of the course provided he/ she has successfully completed the Industrial Training (Passed).

A candidate is eligible to appear for the 6th semester examination if he/ she Puts the required percentage of attendance in 6th semester.

For IVC students

i. Puts the required percentage of attendance in the 6th semester

ii. Should not have failed in more than 6 subjects of 1st year, 3rd & 4th semesters put together.

For IVC students.

i) Puts the required percentage of attendance in the 6th semester

3.3 For Diploma Courses of 3 ½ Years duration:

3.3.1 MET/ CH/ CHPP/ CHPC/ CHOT/ TT

1. A candidate shall be permitted to appear for 1st year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.

2. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the 1st year and pays the examination fee. A candidate who could not pay the 1st year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.

3. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate, who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester exam if he/she

i) Puts the required percentage of attendance in the 4th semester

ii) Should not have failed in more than Four backlog subjects of 1st year.

4. A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

5. Promotion from 5th to 6th semester is automatic (i.e., from 1st spell of Industrial Training to 2nd spell) provided he/she puts the required percentage of attendance, which in this case would be 90 % attendance and attends for the VIVA-VOCE examination at the end of training.

6. A candidate shall be promoted to 7th semester of the course provided he/she has successfully completed both the spells of Industrial Training (Passed).

A candidate is eligible to appear for 7th semester examination if he/she

i) Puts the required percentage of attendance in the 7th semester and

ii) Should not have failed in more than 6 backlog subjects of 1st year,3rd and 4th semesters put together.

iii) Should not have failed in more than six backlog subjects of 3rd and 4th semester put together for IVC students.

3.3.2 For Diploma Courses of 3 ½ Years duration: FW

i) In respect of Diploma in Footwear Technology, the Industrial training is offered in two spells, the 1st spell of Industrial training after the First Year (i.e. III semester of the course) and the second spell of industrial training after the V semester (i.e VI Semester of the course). The promotion rules for this course are on par with the other sandwich Diploma courses except that there is no restriction on number of backlog subjects to get eligibility to appear for the 4th semester examination and ,

A candidate is eligible to appear for 5th semester examination if he/she

1. Puts the required percentage of attendance in the 5th semester and

2. Should not have failed in more than four subjects of 1st year.

ii) A candidate shall be promoted to 7th semester of the course provided he/ she has successfully completed second spell of Industrial Training (Passed).

A candidate is eligible to appear for 7th semester examination if he/she

1. Puts the required percentage of attendance in the 7th semester and

2. Should not have failed in more than 6 backlog subjects of 1st year and 4th semesters put together.

3. Should not have failed in more than six backlog subjects of 4th and 5th semester

put together for IVC students.

3.3.3 For Diploma Courses of 3 ½ Years duration: BM

The same rules as are applicable for conventional courses also apply for these courses. Since the industrial training in respect of these courses is restricted to one semester (6 months) after the 6th semester (3 years) of the course.

A candidate shall be promoted to 7th semester provided he/she puts the required percentage of attendance in 6th semester and pay the examination fee. A candidate, who could not pay the 6th semester examination fee, has to pay the promotion fee prescribed by SBTET from time to time before commencement of the 7th semester (Industrial Training).

OR

Run through system for 1st Year and 3rd semester to 6/7th semester provided that the student puts in 75% of attendance (which can be condoned on medical grounds upto 10%) i.e. attendance after condonation on medical grounds should not be less than 65%.

3.4 OTHER DETAILS

a) In case a candidate does not successfully complete the Industrial training, he / she will have to repeat the training at his / her own cost.

b) The I spell of Industrial training shall commence 10 days after the completion of the last theory examination of 4th Semester.

c) The Second spell of Industrial training shall commence within 10 days after the completion of I spell of Industrial training.

d) Each Semester of Institutional study shall be a minimum of 90 working days. (With 6 working days in a week i.e. from Monday to Saturday, with 7 periods of 50 minutes, duration per day.

4 STUDENTS PERFORMANCE EVALUATION

4.1 AWARD OF DIPLOMA

Successful candidates shall be awarded the Diploma under the following divisions of pass.

1. First Class with Distinction shall be awarded to the candidates who secure an overall aggregate of 75% marks and above.

2. First Class shall be awarded to candidates who secure overall aggregate of 60% marks and above and below 75% marks.

3. Second Class shall be awarded to candidates who secure a pass with an overall aggregate of below 60%.

The Weightage of marks for various year/Semesters which are taken for computing overall aggregate shall be 25% of I year marks + 100% of 3rd and subsequent Semesters.

With respect to the intermediate vocational candidates who are admitted directly into diploma course at the 3rd semester (i.e., second year) level the aggregate of (100%) marks secured at the 3rd and subsequent semesters of study shall alone be taken into consideration for determining the overall percentage of marks secured by the candidates for award of class/division.

4. Second Class shall be awarded to all students, who fail to complete the Diploma in the regular three years and four subsequent examinations, from the first admission.

4.2 EXAMINATION FEE SCHEDULE:

The examination fee should be paid as per the notification issued by State Board of Technical Education and Training from time to time.

4.3 STRUCTURE OF END EXAMINATION QUESTION PAPER:

The question paper for theory examination is patterned in such a manner that the Weightage of periods/marks allotted for each of the topics for a particular subject be considered.

Examination paper is of 3/6/9 hour's duration.

a) Each theory paper consists of Section 'A' and Section 'B'. Section 'A' contains 20 short answer questions out of which 15 questions are to be answered and each carries 2 marks Max. Marks: 15 x 2 = 30.

Section B contains 8 essay type questions including Numerical

questions, out of which 5 questions each carrying 10 marks are to be answered.

Max.Marks: 5 x 10 = 50. Total Maximum Marks: 80.

b) For Engineering Drawing Subject (107) consist of section 'A' and section 'B'. Section 'A' contains four (4) questions. All questions in section 'A' are to be answered and each carries 5 marks. Max. Marks: 4 x 5=20. Section 'B' contains six (6) questions. Out of which four (4) questions to be answered and each question carries 10 Marks. Max. Marks 4 x 10 = 40.

Practical Examinations

For Workshop practice and Laboratory Examinations,

Each student has to pick up a question paper distributed by Lottery System.

Max. Marks for an experiment / exercise : 50%

Max. Marks for VIVA-VOCE : 10%

Total : 60%

In case of practical examinations with 50 marks, the marks will be worked out basing on the above ratio.

In case of any change in the pattern of question paper, the same shall be informed sufficiently in advance to the candidates.

4.4 ISSUE OF MEMORONDUM OF MARKS

All candidates who appear for the end examination will be issued memorandum of marks without any payment of fee. However candidates who lose the original memorandum of marks have to pay the prescribed fee to the Secretary, State Board of Technical Education and Training, Telangana. for each duplicate memo.

4.5 MAXIMUM PERIOD FOR COMPLETION OF DIPLOMA COURSES:

Maximum period for completion of the course is twice the duration of the course from the date of First admission (includes the period of detention and discontinuation of studies by student etc) failing which they will have to forfeit the claim for qualifying for the award of Diploma (They will not be permitted to appear for examinations after that date). This rule applies for all Diploma courses of 3 years and 3 ½ years of engineering and non-engineering courses.

4.6 ELIGIBILITY FOR AWARD OF DIPLOMA

A candidate is eligible for award of Diploma Certificate if he / she fulfils the following academic regulations.

i. He / She pursued a course of study for not less than 3 / 3 ½ academic years & not more than 6 / 7 academic years.

ii. He / she has completed all the subjects.

Students who fail to fulfill all the academic requirements for the award of the Diploma within 6 / 7 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

4.7 RECOUNTING, ISSUE OF PHOTO COPY OF VALUED ANSWER SCRIPT & REVERIFICATION:

4.7.1 a) A candidate desirous of applying for Recounting/ issue of Photo copy of valued answer scripts/ Reverification should submit the application to the Secretary, State Board of Technical Education and Training, Telangana., Hyderabad – 500 063 within 15 days from the date

of receipt of Tabulated Marks Statement by the Principal of concerned Polytechnic or the date specified.

Recounting shall be done for any TWO theory subjects per Year/Semester only, including drawing subjects. No request for recounting shall be entertained from any candidate who is reported to have resorted to Malpractice in that examination. The fee prescribed for Recounting should be paid by way of Demand Draft drawn on any Scheduled Bank payable at Hyderabad in favour of the Secretary, State Board of Technical Education and Training, Telangana., Hyderabad. The verification of the totaling will be done by an Officer of the Board and will be intimated to the candidate by post only.

The following documents should be invariably be enclosed with the application failing which the application will not be considered.

1. Marks secured as per Tabulated Marks Sheet certified by the Principal.
2. Demand draft towards the payment of fee
3. Self – addressed and stamped envelopes of 11" X 5" size.

The applications received after the prescribed date will not be accepted and any correspondence in this regard will not be entertained.

4.7.2 FOR ISSUE OF PHOTO COPIES OF VALUED ANSWER SCRIPTS

1. A candidate desirous of applying for Photo copy of valued answer script/ scripts should submit the application to the Secretary, State Board of Technical Education and Training, Telangana., Hyderabad – 500 063 along with the required fee in the form of Demand Draft within 07 days from the date of receipt of Tabulated Marks Statement by the Principal of concerned Polytechnic or the date specified in the covering letter whichever is earlier.
2. Photo copies of valued answer scripts will be issued to all theory subjects including drawing subjects.
3. The following documents should invariably be enclosed with the application

(1) Marks secured as per Tabulated Marks Sheets certified by the Principal

(2) Self-addressed Stamped Envelope/Cloth-line cover of size 10'' x 14''.

(3) Fee in the form of Demand Draft

4.7.3 FOR RE-VERIFICATION OF THE VALUED ANSWER SCRIPT

1. A candidate desirous of applying for Re-verification of valued answer script should submit the application to the Secretary, State Board of Technical Education and Training, Telangana., Hyderabad – 500 063 along with the required fee in the form of Demand Draft, within 15 days from declaration of result.
2. Re-verification of valued answer script shall be done for all theory subjects including drawing subjects.
3. The following documents should invariably be enclosed with the application failing which the application will not be considered.

(i) Marks secured as per Tabulated Marks Sheets certified by the Principal.

(ii) Fee in the form of Demand Draft.

4.7.4 MALPRACTICE CASES:

If any candidate resorts to any Mal Practice during examinations, he / she shall be booked and the Punishment shall be awarded as per rules and regulations framed by SBTET from time to time.

4.7.5 DISCREPANCIES/ PLEAS:

Any Discrepancy /Pleas regarding results etc., shall be represented to the Board within one month from the date of issue of results. Thereafter, no such cases shall be entertained in any manner.

5 ISSUE OF CERTIFICATES AND VETO

5.1. ISSUE OF DUPLICATE DIPLOMA

If a candidate loses his/her original Diploma Certificate and desires a duplicate to be issued he/she should produce written evidence to this effect. He / she may obtain a duplicate from the Secretary, State Board of Technical Education and Training, Telangana on payment of prescribed fee and on production of an affidavit signed before a First Class Magistrate (Judicial) and *non-traceable certificate* from the Department of Police. In case of damage of original Diploma Certificate, he / she may obtain a duplicate certificate by surrendering the original damaged certificate on payment of prescribed fee to the State Board of Technical Education and Training.

In case the candidate cannot collect the original Diploma within 1 year from the date of issue of the certificate, the candidate has to pay the penalty prescribed by the SBTET from time to time.

5.2 ISSUE OF MIGRATION CERTIFICATE AND TRANSCRIPTS:

The Board on payment of prescribed fee will issue these certificates for the candidates who intend to prosecute Higher Studies in India or Abroad.

5.3 GENERAL

i. The Board may change or amend the academic rules and regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students, for whom it is intended, with effect from the dates notified by the competent authority.

ii. All legal matters pertaining to the State Board of Technical Education and Training are within the jurisdiction of Hyderabad.

iii. In case of any ambiguity in the interpretation of the above rules, the decision of the Secretary, SBTET is final.

DIPLOMA IN CIVIL ENGINEERING
C-16, SCHEME OF INSTRUCTIONS AND EXAMINATIONS
FIRST YEAR

Subject Code	Name of the Subject	Instruction period / week		Total Periods/ year	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY:								
C-101	English	3	-	90	3	20	80	100
C-102	Engineering Mathematics - I	5	-	150	3	20	80	100
C-103	Engineering Physics	4	-	120	3	20	80	100
C-104	Engineering Chemistry & Environmental Studies	4	-	120	3	20	80	100
C-105	Engineering Mechanics	4	-	120	3	20	80	100
C-106	Surveying - I	4	-	120	3	20	80	100
PRACTICAL:								
C-107	Engineering Drawing	-	6	180	3	40	60	100
C-108	Surveying Practicals–I	-	6	180	3	40	60	100
C-109	Physics Lab		3	45	3	20	30	50
C-110	Chemistry Lab			45		20	30	50
C-111	Computer fundamentals Lab	-	3	90	3	40	60	100
	TOTAL	24	18	1260		280	720	1000

DIPLOMA IN CIVIL ENGINEERING

C-16, SCHEME OF INSTRUCTIONS AND EXAMINATIONS

III SEMESTER

Subject Code	Name of the Subject	Instruction period / week		Total Period / year	Scheme of Examination			
		Theory	Practical/Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY:								
C-301	Engineering Mathematics –II	4	-	60	3	20	80	100
C-302	Strength of Materials	5	-	75	3	20	80	100
C-303	Environmental Engineering -I	4	-	60	3	20	80	100
C-304	Surveying-II	5	-	75	3	20	80	100
C-305	Construction Materials	3	-	45	3	20	80	100
C-306	Construction Practice	3	-	45	3	20	80	100
PRACTICAL:								
C-307	Civil Engineering Drawing -I	-	6	90	3	40	60	100
C-308	Communication Skills Laboratory	-	3	45	3	40	60	100
C-309	Surveying Practical and Plotting–II	-	6	90	3	40	60	50
C-310	Material Testing Laboratory	-	3	45	3	40	60	100
	TOTAL	24	18	630		280	720	1000

DIPLOMA IN CIVIL ENGINEERING

C-16, SCHEME OF INSTRUCTIONS AND EXAMINATIONS

IV SEMESTER

Subject Code	Name of the Subject	Instruction period / week		Total Period / year	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY:								
C-401	Theory of Structures	4	-	60	3	20	80	100
C-402	Reinforced Concrete Structures-I	5	-	75	3	20	80	100
C-403	Hydraulics	5	-	75	3	20	80	100
C-404	Quantity Surveying-I	4	-	60	3	20	80	100
C-405	Environmental Engineering-II	4	-	60	3	20	80	100
C-406	Irrigation Engineering	4	-	60	3	20	80	100
PRACTICAL:								
C-407	Civil Engineering Drawing -II	-	4	60	3	40	60	100
C-408	CAD Lab - I	-	6	90	3	40	60	100
C-409	Hydraulics Laboratory	-	3	45	3	40	60	100
C-410	Programming Lab in ‘ C ’	-	3	45	3	40	60	100
	TOTAL	26	16	630		280	720	1000

DIPLOMA IN CIVIL ENGINEERING

C-16, SCHEME OF INSTRUCTIONS AND EXAMINATIONS

V SEMESTER

Subject Code	Name of the Subject	Instruction period / week		Total Period / year	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY:								
C-501	Reinforced Concrete Structures-II	4	-	60	3	20	80	100
C-502	Steel Structures	5	-	75	3	20	80	100
C-503	Construction Management and Entrepreneurship	4	-	60	3	20	80	100
C-504	Transportation Engineering	5	-	75	3	20	80	100
C-505	Quantity Surveying-II	4	-	60	3	20	80	100
C-506	(A) Low Cost Housing, Rural Water Supply & Sanitation (B) Geo- Technical Engineering (C) Maintenance of Buildings	4	-	60	3	20	80	100
PRACTICAL:								
C-507	Structural Engineering Drawing	-	4	60	3	40	60	100
C-508	CAD Lab -II	-	6	90	3	40	60	100
C-509	Construction Technology Lab	-	3	45	3	40	60	100
C-510	Project Work	-	3	45	3	40	60	100
	TOTAL	26	16	630		720	280	1000

DIPLOMA IN CIVIL ENGINEERING

C-16, SCHEME OF INSTRUCTIONS AND EXAMINATIONS

VI SEMESTER
C-601 INDUSTRIAL TRAINING

Scheme of Evaluation

Sl. No	Subject	Duration	Items	Max Marks	Remarks
1	C-601 INDUSTRIAL TRAINING	6 Months	1.First Assessment (at the end of 3rd Month)	100	
			2.Second Assessment (at the end of 6th Month)	100	
			3. Training Report a) Log Book b) Report	 30 30	
			4. Seminar	40	
TOTAL				300	

The Industrial Training Shall carry 300 marks and pass marks is 50% . A candidate failing to secure minimum marks should complete it at his own expenses. No apprenticeship training stipend is payble .

During Industrial Training the candidate shall put in a minimum of 90% of attendance.

1st YEAR

ENGLISH
(Common to all Branches)

Subject Title : English
Subject Code : C - 101
Periods per Week : 03
Periods per Year : 90

Time Schedule

Sl No	Major Topics	No. of Periods	Weightage of Marks	No of Short Answers	No of Long Answers
1	Speaking	19	20	10	-
2	Listening	06	04	02	-
3	Reading	12	10	-	1
4	Grammar	27	34	07	2
5	Writing	26	52	01	5
				-	-
		90	120	20	08

Introduction

Globalization has ushered in an era of opportunities for those who have the necessary competencies. Effective communication is one among them. In C-16 Curriculum the focus is therefore on improving communicative abilities resulting in students becoming industry – ready and employable.

Objectives:

On completion of the course the students shall be able to
• Understand basic principles of language usage and apply them
• Read and comprehend passages
• Write short paragraphs, letters and reports
• Use English appropriately in day-to-day communication

Specific Instructional objectives
1.0 Practice spoken communication suited to various situations.
1.1 Use proper expressions to make requests
1.2 Use proper expressions for asking and giving directions
1.3 Use suitable expressions to state feelings
1.4 Use suitable expressions to express obligations
1.5 Use suitable expressions to extend and accept invitations
1.6 Fix and cancel appointments
1.7 Express likes and dislikes
1.8 Give instructions
1.9 Use everyday expressions in the class room
2 0 Listen and understand.
2.1 Main ideas
2 .2 Specific details
2. 3 Make inferences

3.0 Read and comprehend English.
3.1 Identify main ideas
3.2 Identify specific details
3.3 Draw inferences

3.4 Give contextual meanings of the words
3.5 Perceive tone in a text

4.0 Learn various grammatical structures.
4.1 Use the present tense
4.2 Use the past tense
4.3 Use the future tense
4.4 Identify and use adjectives
4.5 Use prepositions
4.6 State basic sentence structures
4.7 Frame questions to elicit information
4.8 Frame questions for confirmation
4.9 Use active voice
4.10 Use passive voice
4.11 Use indirect speech
4.12 Use direct speech

5.0 Learn to excel in various forms of written communication.
5.1 Identify components of a good paragraph
5.2 Write different types of paragraphs
5.3 Distinguish between formal and informal letters
5.4 Write personal letters
5.5 Write official letters
5.6 Prepare a resume
5.7 Write a cover letter
5.8 Report industrial visits
5.9 Make notes
5.10 Present and interpret data from flow chart, tree diagram and table

Course Material

The text book prepared by the faculty of English of Polytechnics.

Reference Books

1. Essential English Grammar Raymond Murphy
2. Learn English Santanu Sinha Chaudhuri
3. Grammar Builder Oxford University Press
4. Word Power made Easy Norman Lewis
5. Spoken English Shashi Kumar and Dhamija
6. English Grammar and Composition – David Greene (Mc Millan

Engineering Mathematics – I
(Common to all)

Subject Title : Engineering Mathematics-I
Subject Code : C-102
Periods per week : 05
Periods per Semester : 150

Blue Print

S. No	Major Topic	No of Periods		Weightage of Marks	Short Type			Essay Type		
	Unit - I : Algebra	**Theory**	**Practice**		**R**	**U**	**App**	**R**	**U**	**App**
1	Logarithms	3	1	2	1	0	0	0	0	0
2	Partial Fractions	5	1	4	1	1	0	0	0	0
3	Matrices and Determinants	20	6	16	1	2	0	0	½	½
	Unit - II : Trigonometry									
4	Compound Angles	5	2	2	1	0	0	0	0	0
5	Multiple and Submultiple angles	6	2	4	1	1	0	0	0	0
6	Transformations	8	3	10	0	0	0	0	½	½
7	Inverse Trigonometric Functions	8	3	10	0	0	0	0	½	½
8	Properties of triangles	2	0	2	1	0	0	0	0	0
9	Hyperbolic Functions	2	0	0	0	0	0	0	0	0
10	Complex Numbers	4	2	4	1	1	0	0	0	0
	Unit III : Co-ordinate Geometry									
11	Straight Lines	4	2	9	1	1	0	0	½	0
12	Circles	5	2	9	1	1	0	0	½	0
	Unit – IV : Differential Calculus									
13	Limits and Continuity	6	2	4	1	1	0	0	0	0
14	Differentiation	22	10	24	1	1	0	0	1	1
S. No	**Major Topic**	**No of Periods**		**Weightage of Marks**	**Short Type**			**Essay Type**		
	Unit - V : Applications of Differentiation	**Theory**	**Practice**		**R**	**U**	**App**	**R**	**U**	**App**
15	Geometrical Applications	5	2	10	0	0	0	0	0	1
16	Maxima and Minima	5	2	10	0	0	0	0	0	1
	Total	110	40	120	11	9			3½	4½
				Marks	22	18	0	0	35	45

R: Remembering type **22** marks
U: Understading type **53** marks
App: Application type **45** marks

ENGINEERING MATHEMATICS – I
COMMON TO ALL BRANCHES – 102

Objectives
Upon completion of the course the student shall be able to:
UNIT – I

Algebra

1.0 Use Logarithms in engineering calculations

1.1 Define logarithm and list its properties.

1.2 Distinguish natural logarithms and common logarithms.

1.3 Explain the meaning of e and exponential function.

1.4 State logarithm as a function and its graphical representation.

1.5 Use the logarithms in engineering calculations.

2.0 Resolve Rational Fraction into sum of Partial Fractions in engineering problems

2.1 Define the following fractions of polynomials:

1. Rational,
2. Proper and
3. Improper

2.2 Explain the procedure of resolving rational fractions of the type mentioned below into partial fractions

$$i)\quad \frac{f(x)}{(x+a)(x+b)(x+c)} \qquad ii)\quad \frac{f(x)}{(x+a)^2(x+b)(x+c)}$$

$$iii)\quad \frac{f(x)}{(x^2+a)(x+b)} \qquad iv)\quad \frac{f(x)}{(x+a)(x^2+b)^2}$$

3.0 Use Matrices for solving engineering problems

3.1 Define a matrix and order of a matrix.

3.2 State various types of matrices with examples (emphasis on 3rd order square matrices).

3.3 Compute sum, scalar multiplication and product of matrices.

3.4 Illustrate the properties of these operations such as associative, distributive, commutative properties with examples and counter examples.

3.5 Define the transpose of a matrix and write its properties.

3.6 Define symmetric and skew-symmetric matrices.

3.7 Resolve a square matrix into a sum of symmetric and skew- symmetric matrices with examples in all cases.

3.8 Define minor, co-factor of an element of a 3x3 square matrix with examples.

3.9 Expand the determinant of a 3 x 3 matrix using Laplace expansion formula.

3.10 Distinguish singular and non-singular matrices.

3.11 Apply the properties of determinants to solve problems.

3.12 Solve system of 3 linear equations in 3 unknowns using Cramer's rule.

3.13 Define multiplicative inverse of a matrix and list properties of adjoint and inverse.

3.14 Compute adjoint and multiplicative inverse of a square matrix.

3.15 Solve system of 3 linear equations in 3 unknowns by matrix inversion method

3.16 State elementary row operations.

3.17 Solve a system of 3 linear equations in 3 unknowns by Gauss- Jordan method

UNIT – II

Trigonometry :

4.0 Solve simple problems on Compound Angles

4.1 Define compound angles and state the formulae of Sin(A±B), Cos(A±B), tan(A±B) and Cot(A±B)

4.2 Give simple examples on compound angles to derive the values of $Sin15^0$, $Cos15^0$, $Sin75^0$, $Cos75^0$, $\tan 15^0$, $\tan 75^0$ etc.

4.3 Derive identities like Sin(A+B) .Sn(A–B) = $Sin^2 A – Sin^2 B$ etc.,

4.4 Solve simple problems on compound angles.

5.0 Solve problems using the formulae for Multiple and Sub- multiple Angles

5.1 Derive the formulae of multiple angles 2A, 3A etc and sub multiple angles A/2 in terms of angle A of trigonometric functions.

5.2 Derive useful allied formulas like $\sin^2 A = (1– \cos 2A)/2$ etc.

5.3 Solve simple problems using the above formulae

6.0 Apply Transformations for solving the problems in Trigonometry

6.1 Derive the formulae on transforming sum or difference of two trigonometric ratios in to a product and vice versa - examples on these formulae.

6.2 Solve problems by applying these formulae to sum or difference or product of three or more terms.

7.0 Use Inverse Trigonometric Functions for solving engineering problems

7.1 Explain the concept of the inverse of a trigonometric function by selecting an appropriate domain and range.

7.2 Define inverses of six trigonometric functions along with their domains and ranges.

7.3 Derive relations between inverse trigonometric functions so that given $A = \sin^{-1}x$, express angle A in terms of other inverse trigonometric functions - with examples.

7.4 State various properties of inverse trigonometric functions and identities like $\sin^{-1}x+\cos^{-1}x = \frac{\pi}{2}$ etc.

7.5 Derive formulae like $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\left(\frac{x+y}{1-xy}\right),\ where\ x \geq 0, y \geq 0, xy < 1$ etc., and solve simple problems.

8.0 Appreciate Properties of triangles

8.1 State sine rule, cosine rule, tangent rule and projection rule .

9.0 Represent the Hyperbolic Functions in terms of logarithm functions

9.1 Define Sinh x, cosh x and tanh x and list the hyperbolic identities.

9.2 Represent inverse hyperbolic functions in terms of logarithms.

10.0 Represent Complex numbers in various forms

10.1 Define complex number, its modulus , conjugate and list their properties.

10.2 Define the operations on complex numbers with examples.

10.3 Define amplitude of a complex number

10.4 Represent the complex number in various forms like modulus-amplitude (polar) form, Exponential (Euler) form – illustrate with examples.

UNIT - III

Coordinate Geometry

11.0 Solve the problems on Straight lines

11.1 Write the different forms of a straight line – point slope form, two point form, intercept form, normal form and general form

11.2 Solve simple problems on the above forms

11.3 Find distance of a point from a line, acute angle between two lines, intersection of two non-parallel lines and distance between two parallel lines.

12.0 Solve the problems on Circles

12.1 Define locus of a point – circle and its equation.

12.2 Find the equation of a circle given

(i) Center and radius

(ii) Two ends of a diameter

(iii) Centre and a point on the circumference

(iv) Three non-collinear points

(v) Centre and tangent

12.3 Write the general equation of a circle and find the centre and radius.

12.4 Write the equation of tangent and normal at a point on the circle.

12.5 Solve the problems to find the equations of tangent and normal.

UNIT - IV

Differential Calculus

13.0 Use the concepts of Limit and Continuity for solving the problems

13.1 Explain the concept of limit and meaning of $\lim_{x\to a} f(x)=l$ and state the properties of limits .

13.2 Mention the Standard limits $\lim_{x\to a}\frac{x^n-a^n}{x-a}$, $\lim_{x\to 0}\frac{\sin x}{x}$, $\lim_{x\to 0}\frac{\tan x}{x}$, $\lim_{x\to 0}\frac{a^x-1}{x}$, $\lim_{x\to 0}\frac{e^x-1}{x}$, $\lim_{x\to 0}(1+x)^{\frac{1}{x}}$, $\lim_{x\to\infty}\left(1+\frac{1}{x}\right)^x$ (All without proof).

13.3 Solve the problems using the above standard limits

13.4 Evaluate the limits of the type $\lim_{x\to l}\frac{ax^2+bx+c}{\alpha x^2+\beta x+\gamma}$ and $\lim_{x\to\infty}\frac{f(x)}{g(x)}$

13.5 Explain the concept of continuity of a function at a point and on an interval with some examples whether a given function is continuous or not.

14.0 Appreciate Differentiation and its meaning in engineering situations

14.1 State the concept of derivative of a function y = f(x) – definition, first principle as $\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ and also provide standard notations to denote the derivative of a function.

14.2 State the significance of derivative in scientific and engineering applications.

14.3 Find the derivatives of elementary functions like x^n , a^x, e^x, log x, sin x, cos x, tanx, Secx, Cosecx and Cot x using the first principles.

14.4 Find the derivatives of simple functions from the first principle .

14.5 State the rules of differentiation of sum, difference, scalar multiplication, product and quotient of functions with illustrative and simple examples.

14.6 Explain the method of differentiation of a function of a function (Chain rule) with illustrative examples such as

(i) $\sqrt{t^2+\frac{2}{t}}$ **(ii)** $x^2\sin 2x$ **(iii)** $\frac{x}{\sqrt{x^2+1}}$ **(iv)** $\log\left(\sin(\cos x)\right)$.

14.7 Find the derivatives of Inverse Trigonometric functions and examples using the Trigonometric transformations.

14.8 Explain the method of differentiation of a function with respect to another function and also differentiation of parametric functions with examples.

14.9 Find the derivatives of hyperbolic functions.

14.10 Explain the procedures for finding the derivatives of implicit function with examples.

14.11 Explain the need of taking logarithms for differentiating some functions with examples like $[f(x)]^{g(x)}$.

14.12 Explain the concept of finding the higher order derivatives of second and third order with examples.

14.13 Explain the concept of functions of several variables, partial derivatives and difference between the ordinary and partial derivatives with simple examples.

14.14 Explain the definition of Homogenous function of degree n

14.15 Explain Euler's theorem for homogeneous functions with applications to simple problems.

UNIT - V

Applications of the Differentiation

15.0 Understand the Geometrical Applications of Derivatives

15.1 State the geometrical meaning of the derivative as the slope of the tangent to the curve y=f(x) at any point on the curve.

15.2 Explain the concept of derivative to find the slope of tangent and to find the equation of tangent and normal to the curve y=f(x) at any point on it.

15.3 Find the lengths of tangent, normal, sub-tangent and sub normal at any point on the curve y=f(x) .

15.4 Explain the concept of angle between two curves and procedure for finding the angle between two given curves with illustrative examples.

16.0 Use Derivatives to find extreme values of functions

16.1 Define the concept of increasing and decreasing functions.

16.2 Explain the conditions to find points where the given function is increasing or decreasing with illustrative examples.

16.3 Explain the procedure to find the extreme values (maxima or minima) of a function of single variable - simple problems yielding maxima and minima.

16.4 Solve problems on maxima and minima in applications like finding areas, volumes, etc.

COURSE CONTENT

Unit-I

Algebra

1. Logarithms :

   Definition of logarithm and its properties, natural and common logarithms; the meaning of e and exponential function, logarithm as a function and its graphical representation.

2. Partial Fractions :

   Rational, proper and improper fractions of polynomials. Resolving rational fractions in to their partial fractions covering the types mentioned below:

$$i) \quad \frac{f(x)}{(x+a)(x+b)(x+c)} \qquad ii) \quad \frac{f(x)}{(x+a)^2(x+b)(x+c)}$$

$$iii) \quad \frac{f(x)}{(x^2+a)(x+b)} \qquad iv) \quad \frac{f(x)}{(x+a)(x^2+b)^2}$$

Matrices:

3. Definition of matrix, types of matrices-examples, algebra of matrices-equality of two matrices, sum, scalar multiplication and product of matrices. Transpose of a matrix, Symmetric, skew-symmetric matrices-Minor, cofactor of an element-Determinant of a square matrix-Laplace's expansion, properties of determinants. Singular and non-singular matrices-Adjoint and multiplicative inverse of a square matrix- examples-System of linear equations in 3 variables-Solutions by Cramers's rule, Matrix inversion method-examples-Elementary row operations on matrices -Gauss-Jordan method to solve a system of equations.

Unit-II

Trigonometry :

4. Compound angles: Formulas of sin(A±B), cos(A±B), tan(A±B),cot(A±B),and related identities with problems.
5. Multiple and sub-multiple angles: trigonometric ratios of multiple angles 2A, 3A and submultiple angle A/2 with problems.
6. Transformations of products into sums or differences and vice versa simple problems
7. Inverse trigonometric functions : definition, domains and ranges-basic properties-problems.
8. Properties and solutions of triangles: relation between sides and angles of a triangle- sine rule, cosine rule, tangent rule and projection rule – statements only .

9. Hyperbolic functions: Definitions of hyperbolic functions, identities of hyperbolic functions, inverse hyperbolic functions and expression of inverse hyperbolic functions in terms of logarithms.
10. Complex Numbers : Definition of a complex number, Modulus and conjugate of a complex number, Arithmetic operations on complex numbers, Modulus- Amplitude (polar) form, Exponential form(Euler) form of a complex number- Problems.

UNIT-III

Coordinate geometry

11. Straight lines: various forms of straight lines, angle between lines, perpendicular distance from a point, distance between parallel lines-examples.
12. Circle: locus of a point, Circle definition-Circle equation given (i) center and radius, (ii) two ends of a diameter (iii) centre and a point on the circumference (iv) three non collinear points and (v) centre and tangent equation - general equation of a circle - finding center, radius: tangent, normal to circle at a point on it.

UNIT-IV

Differential Calculus

13. Concept of Limit- Definition- Properties of Limits and Standard Limits -Simple Problems- Continuity of a function at a point- Simple Examples only.
14. Concept of derivative- definition (first principle)- different notations-derivatives of elementary functions - problems. Derivatives of sum, product, quotient, scalar multiplication of functions - problems. Chain rule, derivatives of inverse trigonometric functions, derivative of a function with respect to another function, derivative of parametric functions, derivative of hyperbolic, implicit functions, logarthmic differentiation – problems in each case. Higher order derivatives - examples – functions of several variables – partial differentiation, Euler's theorem-simple problems.

UNIT-V

Applications of Derivatives:

15. Geometrical meaning of the derivative, equations of Tangent and normal to a curve at any point. Lengths of tangent, normal, subtangent and subnormal to the curve at any point . Angle between the curves - problems.

16. Applications of the derivative to find the extreme values – Increasing and decreasing functions, finding the maxima and minima of simple functions - problems leading to applications of maxima and minima.

Reference Books :

1. A text book of matrices by Shanti Narayan,
2. Plane Trigonometry, by S.L Loney
3. Co-ordinate Geometry, by S.L Loney
4. Thomas Calculus, Pearson Addison-Wesley publishers
5. Calculus – I, by Shanti Narayan and Manicavachgam Pillai, S.V Publications

ENGINEERING PHYSICS

Subject Title : Engineering Physics
Subject Code : C -103
Periods per week : 04
Total periods per year : 120

TIME SCHEDULE

S.No	Major Topics	No. of Periods	Weightage of Marks	Short Answer Type (2 marks)	Essay Type
1.	Units and Dimensions	08	04	2	-
2.	Elements of Vectors	12	14	2	1
3.	Kinematics	12	14	2	1
4.	Friction	08	04	2	-
5.	Work, Power and Energy	12	12	1	1
6.	Simple Harmonic Motion	12	14	2	1
7.	Heat & Thermodynamics	12	14	2	1
8.	Sound	12	14	2	1
9.	Properties of matter	08	04	2	-
10.	Electricity & magnetism	14	14	2	1
11.	Modern Physics	10	12	1	1
	Total:	**120**	**120**	**20**	**8**

OBJECTIVES

Upon completion of the course the student shall be able to

1.0 Understand the concept of Units and dimensions

1.1 Explain the concept of Units
1.2 Define the terms
a) Physical quantity, b) Fundamental physical quantities and
c) Derived physical quantities
1.3 Define unit
1.4 Define fundamental units and derived units
1.5 State SI units with symbols
1.6 State Multiples and submultiples in SI system
1.7 State Rules of writing S.I. units
1.8 State advantages of SI units
1.9 Define Dimensions
1.10 Write Dimensional formulae
1.11 Derive dimensional formulae of physical quantities
1.12 List dimensional constants and dimensionless quantities
1.13 State the principle of Homogeneity of Dimensions
1.14 State the applications of Dimensional analysis (without problems)
1.15 State the limitations of dimensional analysis

2.0 Understand the concept of Elements of Vectors

2.1 Explain the concept of Vectors
2.2 Define Scalar and Vector quantities
2.3 Give examples for scalar and vector quantities
2.4 Represent a vector graphically
2.5 Classify the Types of Vectors
2.6 Resolve the vectors
2.7 Determine the Resultant of a vector by component method

2.8 Represent a vector in space using unit vectors (i, j, k)
2.9 State triangle law of addition of vectors
2.10 State parallelogram law of addition of vectors
2.11 Illustrate parallelogram law of vectors in case of flying bird and sling.
2.12 Derive an expression for magnitude and direction of resultant of two vectors
2.13 State polygon law of addition of vectors
2.14 Explain subtraction of vectors
2.15 Define Dot product of two vectors with examples (Work done, Power)
2.16 Mention the properties of Dot product
2.17 Define Cross products of two vectors and state formulae for torque and linear velocity
2.18 Mention the properties of Cross product.
2.19 Solve the related numerical problems

3.0 Understand the concept of Kinematics

3.1 Write the equations of motion in a straight line
3.2 Explain the acceleration due to gravity
3.3 Derive expressions for vertical motion
a) Maximum Height, b) time of ascent, c) time of descent, and d) time of flight
3.4 Derive an expression for height of a tower when a body projected vertically upwards from the top of a tower.
3.5 Explain projectile motion with examples
3.6 Explain Horizontal projection
3.7 Derive an expression for the path of a projectile in horizontal projection
3.8 Explain Oblique projection
3.9 Derive an expression for the path of projectile in Oblique projection
3.10 Derive formulae for projectile in Oblique projection
a) Maximum Height, b) time of ascent, c) time of descent, and d) time of flight
e) Horizontal Range, f) Maximum range
3.11 Solve the related numerical problems

4.0 Understand the concept of Friction

4.1 Define friction and state its causes
4.2 Classify the types of friction
4.3 Explain the concept of Normal reaction
4.4 State the laws of friction
4.5 Define coefficients of friction
4.6 Explain the Angle of friction
4.7 Derive an expression for acceleration of a body on a rough horizontal surface
4.8 Derive an expression for the displacement and time taken to come to rest over a
rough horizontal surface
4.9 List the Advantages and Disadvantages of friction
4.10 Mention the methods of minimizing friction
4.11 Solve the related numerical problems

5.0 Understand the concept of Work, Power, and Energy

5.1 Define the terms Work, Power and Energy.
5.2 State SI units and dimensional formula for Work, Power, and Energy
5.3 Define potential energy
5.4 Derive an expression for Potential energy with examples
5.5 Define kinetic energy
5.6 Derive an expression for kinetic energy with examples
5.7 State and prove Work- Energy theorem
5.8 Explain the relation between Kinetic energy and momentum
5.9 State the law of conservation of energy

5.10 Verify the law of conservation of energy in the case of a freely falling body
5.11 Solve the related numerical problems

6.0 Understand the concept of Simple harmonic motion

6.1 Define Simple harmonic motion
6.2 State the conditions of Simple harmonic motion
6.3 Give examples for Simple harmonic motion
6.4 Show that the tip of the projection of a body moving in circular path with uniform speed is SHM
6.5 Derive an expression for displacement of a body executing SHM
6.6 Derive an expression for velocity of a body executing SHM
6.7 Derive an expression for acceleration of a body executing SHM
6.8 Derive expressions for Time period and frequency of S H M
6.9 Define phase of S H M
6.10 Derive expression for Time period of a simple pendulum
6.11 State the laws of simple pendulum
6.12 Explain seconds pendulum
6.13 Solve the related numerical problems

7.0 Understand the concept of Heat and thermodynamics

7.1 Explain the concept of expansion of gases
7.2 Explain Boyle's law
7.3 State Charle's laws in terms of absolute temperature
7.4 Define absolute zero temperature
7.5 Explain absolute scale of temperature
7.6 Define ideal gas
7.7 Derive the ideal gas equation.
7.8 Define gas constant and Universal gas constant
7.9 Explain why universal gas constant is same for all gases
7.10 State SI unit of universal gas constant
7.11 Calculate the value of universal gas constant
7.12 State the gas equation in terms of density
7.13 Distinguish between r and R
7.14 Define Isothermal process
7.15 Define adiabatic process
7.16 Distinguish between isothermal and adiabatic process
7.17 State first and second laws of thermodynamics
7.18 Define specific heats & molar specific heats of a gas
7.19 Derive the relation $C_p - C_v = R$
7.20 Solve the related numerical problems

8.0 Understand the concept of Sound

8.1 Define the term sound
8.2 Explain longitudinal and transverse wave motion
8.3 Distinguish between musical sound and noise
8.4 Explain noise pollution and state SI unit for noise
8.5 Explain causes of noise pollution
8.6 Explain effects of noise pollution
8.7 Explain methods of minimizing noise pollution
8.8 Explain the phenomenon of beats
8.9 List the applications of beats
8.10 Define Doppler effect
8.11 List the Applications of Doppler effect
8.12 Explain reverberation and reverberation time

8.13 Write Sabine's formula
8.14 Explain echoes
8.15 State conditions of a good auditorium
8.16 Solve the related numerical problems

9.0 Understand the properties of matter

9.1 Define terms Elasticity and plasticity
9.2 Define the terms stress and strain
9.3 State the units and dimensional formulae for stress and strain
9.4 State the Hooke's law
9.5 Define the surface tension
9.6 Explain Surface tension with reference to molecular theory
9.7 Define angle of contact
9.8 Define capillarity and state examples
9.9 Write the formula for surface tension based on capilarity
9.10 Explain the concept of Viscosity
9.11 Provide examples for surface tension and Viscosity
9.12 State Newton's formula for viscous force
9.13 Define co-efficient of viscosity
9.14 Explain the effect of temperature on viscosity of liquids and gases
9.15 State Poiseulle's equation for Co-efficient of viscosity
9.16 Solve the related numerical problems

10.0 Understand the concept of Electricity and Magnetism

10.1 Explain the concept of Electricity
10.2 State the Ohm's law
10.3 Explain the Ohm's law
10.4 Define specific resistance, conductance and their units
10.5 State Kichoff's laws
10.6 Explain Kichoff's laws
10.7 Describe Wheatstone's bridge with legible sketch
10.8 Derive an expression for balancing condition of Wheatstone's bridge
10.9 Explain the basic concept of Meter Bridge with legible sketch
10.10 Explain the concept of magnetism
10.11 State the Coulomb's inverse square law of magnetism
10.12 Define magnetic field and magnetic lines of force
10.13 State the Magnetic induction field strength-units and dimensions
10.14 Describe the moment of couple on a bar magnet placed in a uniform magnetic field
10.15 Solve the related numerical problems

11.0 Understand the concept of Modern physics

11.1 Explain Photo-electric effect
11.2 Write Einstein's photoelectric equation
11.3 State the laws of photoelectric effect
11.4 Explain the Working of a photoelectric cell
11.5 List the Applications of photoelectric effect
11.6 Recapitulate refraction of light and its laws
11.7 Define critical angle
11.8 Explain the Total Internal Reflection
11.9 Explain the basic principle of optical Fiber
11.10 Mention types of optical fibbers
11.11 List the applications of optical Fiber
11.12 Define super conductor and superconductivity

11.13 List the examples of superconducting materials
11.14 List the applications of superconductors

COURSE CONTENT

1. Units and Dimensions:

Introduction – Physical quantity – Fundamental and Derived quantities – Fundamental and Derived units- SI units –Multiples and Sub multiples – Rules for writing S.I. units- Advantages of SI units – Dimensions and Dimensional formulae- Dimensional constants and Dimensionless quantities- Principle of Homogeneity- Applications and limitations of Dimensional analysis.

2. Elements of Vectors:

Scalars and Vectors –Types of vectors(Proper Vector, Null Vector, Unit Vector, Equal , Negative Vector, Like Vectors, Co-Initial Vectors, Co-planar Vectors and Position Vector).Addition of vectors- Representation of vectors- Resolution of vectors - Parallelogram, Triangle and Polygon laws of vectors–Subtraction of vectors- Dot and Cross products of vectors-Problems

3. Kinematics:

Introduction- Concept of acceleration due to gravity- Equations of motion for a freely falling body and for a body thrown up vertically- Projectiles- Horizontal and Oblique projections- Expressions for maximum height, time of flight, range - problems

4. Friction:

Introduction to friction- Causes- Types of friction- Laws of friction -Angle of friction— Motion of a body over a horizontal surface- Advantages and disadvantages of friction- Methods of reducing friction – Problems

5. Work, Power and Energy:

Work, Power and Energy- Definitions and explanation- potential energy- kinetic energy-Derivations of Potential and Kinetic energies-K.E and Momentum relation - Work-Energy theorem- Law of Conservation of energy- Problems

6. Simple Harmonic Motion:

Introduction- Conditions of SHM- Definition- Examples- Expressions for displacement, velocity, acceleration, Time period, frequency and phase in SHM- Time period of a simple pendulum- Laws of simple pendulum-seconds pendulum- Problems

7. Heat and Thermodynamics:

Expansion of Gases- Boyle's law- Absolute scale of temperature- Charle's laws- Ideal gas equation- Universal gas constant- Differences between r and R- Isothermal and adiabatic processes- Laws of thermodynamics- Specific heats of a gas - Problems

8. Sound:

Sound- Nature of sound- Types of wave motion - Musical sound and noise- Noise pollution – Causes & effects- Methods of reducing noise pollution- Beats- Doppler effect- Echo- Reverberation-Reverberation time-Sabine's formula-Condition of good auditorium- Problems

9. Properties of matter

Definition of Elasticity –Definition of stress and strain -the units and dimensional formulae for stress and strain-The Hooke's law- Definition of surface tension- Explanation of Surface tension with reference to molecular theory - Definition of angle of contact - Definition of capillarity -The formula for surface tension based on

capillarity - Explanation of concept of Viscosity - Examples for surface tension and Viscosity - Newton's formula for viscous force- Definition of co-efficient of viscosity- The effect of temperature on viscosity of liquids and gases - Poiseulle's equation for Co-efficient of viscosity- The related numerical problems

10. Electricity & Magnetism:

Ohm's law and explanation- Specific resistance- Kirchoff's laws- Wheatstone's bridge - Meter bridge- Coulomb's inverse square law magnetic field- magnetic lines of force-Magnetic induction field strength-moment of couple- problems.

11. Modern Physics;

Photoelectric effect –Einstein's photoelectric equation-laws of photoelectric effect - photoelectric cell –Applications of photo electric effect- Total internal reflection- fiber optics- -principle of an optical fiber-types of optical fibers - Applications of optical fibers- concepts of superconductivity - applications

REFERENCE BOOKS

1. Intermediate physics Volume- I & 2	Telugu Academy
2. Text book of physics	Resnick & Holiday
3. Engineering physics	Gaur and Gupta
4. Fundamental Physics Volume -1 & 2	K.L.Gomber and K.L.Gogia

Blue Print for setting question paper at different levels

S.No	Major Topics	No. of Periods	Weightage of Marks	Short answer type			Essay type		
				K	U	A	K	U	A
1.	Units and Dimensions	08	04	2	0	0	0	0	0
2.	Elements of Vectors	12	14	0	0	2	0	0	1
3.	Kinematics	12	14	0	2	0	1	0	0
4.	Friction	08	04	2	0	0	0	0	0
5.	Work, Power and Energy	12	12	0	0	1	0	1	0
6.	Simple Harmonic Motion	12	14	0	0	2	0	1	0
7.	Heat & Thermodynamics	12	14	0	2	0	1	0	0
8.	Sound	12	14	0	2	0	0	1	0
9.	Properties of Matter	08	04	1	1	0	0	0	0
10.	Electricity & magnetism	14	14	0	2	0	0	0	1
11.	Modern Physics	10	12	1	0	0	0	1	0
	Total:	**120**	**120**	**6**	**9**	**5**	**2**	**4**	**2**

ENGG. CHEMISTRY & ENVIRONMENTAL STUDIES
(Common Subject)

Subject Title : Engg. Chemistry & Environmental Studies
Subject Code : C -104
Total periods per year : 120
Curriculum : C-16

Blue Print

S.No	Major topic	No of Periods	Weightage of marks	Short Type (2 Marks)	Essay Type (10 Marks)	Remarks
1	Fundamentals of Chemistry	18	18	4	1	
2	Solutions	10	9	2	½	5 mark
3	Acids and bases	10	9	2	½	5 mark
4	Principles of Metallurgy	10	10	0	1	
5	Electrochemistry	14	14	2	1	
6	Corrosion	8	10	0	1	
7	Water Technology	14	14	2	1	
8	Polymers	12	14	2	1	
9	Fuels	6	4	2	0	
10	Environmental Studies	18	18	4	1	
	Total	120	120	20	08	
				40	80	

OBJECTIVES

Upon completion of the course the student shall be able to

A. ENGINEERING CHEMISTRY

1.0 Fundamentals of Chemistry

1.1 Explain the fundamental particles of an atom like electron, proton and neutron etc.,

1.2 Explain the concept of atomic number and mass number

1.3 State the Postulates of Bohr's atomic theory and its limitations

1.4 Explain the concept of Quantum numbers with examples

1.5 Explain 1.Aufbau's principle, 2.Hund's rule and 3.Pauli's exclusion principle with examples.

1.6 Define Orbital.

1.7 Draw the shapes of s, p and d Orbitals.

1.8 Distinguish between Orbit and Orbital

1.9 Write the electronic configuration of elements up to atomic number 30

1.10 Define chemical bond.

1.11 Explain the Postulates of Electronic theory of valency

1.12 Define and explain three types of Chemical bonding viz., Ionic, Covalent,

Coordinate covalent bond with examples.

1.13 Explain bond formation in NaCl and MgO

1.14 List the Properties of Ionic compounds

1.15 Explain covalent bond formation in Hydrogen molecule, Oxygen molecule, and Nitrogen molecule using Lewis dot method.

1.16 List the Properties of Covalent compounds

1.17 Distinguish between ionic compounds and covalent compounds.

1.18 Define the terms 1.Oxidation, 2.Reduction 3.Oxidation number 4. Valency, with examples.

1.19 Calculate the Oxidation Number

1.20 Differentiate between Oxidation Number and Valency.

2.0 Solutions

2.1 Define the terms 1.Solution, 2.Solute and 3.Solvent

2.2 Classify solutions based on physical state.

2.3 Define solubility, unsaturated, saturated and super saturated solutions.

2.4 Define mole.

2.5 Explain Mole concept with examples.'

2.6 Define the terms 1. Atomic weight, 2. Molecular weight and 3. Equivalent weight

2.7 Calculate Molecular weight and Equivalent weight of Acids, Bases and Salts.

2.8 Define Molarity and Normality.

2.9 Solve Numerical problems on Mole, Molarity and Normality

3.0 Acids and bases

3.1 Explain Arrhenius theory of Acids and Bases

3.2 State the limitations of Arrhenius theory of Acids and Bases

3.3 Explain Bronsted – Lowry theory of acids and bases.

3.4 State the limitations of Bronsted – Lowry theory of acids and bases.

3.5 Explain Lewis theory of acids and bases

3.6 State the limitations of Lewis theory of acids and bases

3.7 Explain the Ionic product of water

3.8 Define pH and explain Sorenson scale

3.9 Solve the Numerical problems on pH (Strong Acids and Bases)

3.10 Define buffer solution and give examples.

3.11 State the applications of buffer solutions.

4. 0 Principles of Metallurgy

4.1 List the Characteristics of Metals.

4.2 Distinguish between Metals and Non Metals

4.3 Define the terms 1.Metallurgy 2.Mineral, 3.Ore, 4. Gangue, 5. Flux and 6. Slag

4.4 Describe Froth Floatation method of concentration of ore.

4.5 Describe the methods involved in extraction of crude metal- Roasting, Calcination and Smelting.

4.6 Explain the purification of Metals by Electrolytic Refining

4.7 Define an Alloy

4.8 Write the Composition of the following alloys:1.Brass, 2.German silver,

and Nichrome

4.9 List the uses of following Alloys: Brass, German silver, Nichrome

5.0 Electrochemistry

5.1 Define the terms1. conductor, 2. Insulator, 3.Electrolyte and 4.Non – electrolyte

5.2 Types of electrolytes.- strong and weak with examples.

5.3 Distinguish between metallic conductors and Electrolytic conductors.

5.4 Explain Arrhenius theory of electrolytic dissociation

5.5 Explain electrolysis of fused NaCl.

5.6 Explain Faraday's laws of electrolysis

5.7 Define Chemical equivalent, Electrochemical equivalent.

5.8 Solve the Numerical problems based on Faraday's laws of electrolysis

5.9 Define Galvanic cell

5.10 Explain the construction and working of Galvanic cell

5.11 Distinguish between electrolytic cell and galvanic cell

5.12 Explain the standard electrode potentials

5.13 Define electrochemical series and explain its significance.

5.14 Define and explain emf of a cell.

5.15 Solve the numerical problems on emf of cell

6.0 Corrosion

6.1 Define the term corrosion

6.2 Explain the Factors influencing the rate of corrosion

6.3 Explain the concept of electrochemical theory of corrosion

6.4 Describe the formation of a) composition cell, b) stress cell c) concentration cell

6.5 Define rust and explain the mechanism of rusting of iron with chemical reactions.

6.6 Explain the methods of prevention of corrosion: a) Protective coatings
b) Cathodic protection (Sacrificial anode process and Impressed – voltage process)

7. 0 Water Technology

7.1 State the various Sources of water.

7.2 Define the terms soft water and hard water with examples

7.3 Define hardness of water.

7.4 Explain temporary and permanent hardness of water.

7.5 List the usual chemical compounds causing hardness (with Formulae)

7.6 Define Degree of hardness, units of hardness in ppm (mg/L) and numerical problems related to hardness.

7.7 Disadvantages of using hard water in industries.

7.8 Explain the methods of softening of hard water: a) permutit process b).Ion-Exchange process.

7.9 Essential qualities of drinking water.

7.10 Explain municipal treatment of water for drinking purpose.

7.11 Define Osmosis and Reverse Osmosis(RO).

7.12 List the advantages of RO

8.0 Polymers

8.1 Explain the concept of polymerisation

8.2 Describe the methods of polymerisation a) addition polymerisation b) condensation polymerization with examples.

8.3 Define the term plastic

8.4 Types of plastics with examples.

8.5 Distinguish between thermoplastics and thermosetting plastics

8.6 List the Characteristics of plastics.

8.7 State the advantages of plastics over traditional materials

8.8 State the disadvantages of using plastics.

8.9 Explain the methods of preparation and uses of the following plastics:
1. Polythene, 2. PVC, 3.Teflon, 4. Polystyrene 5. Urea formaldehyde
6. Bakelite(only flow chart i.e. without chemical equations).

8.10 Define the term natural rubber

8.11 State the structural formula of Natural rubber

8.12 Explain the processing of Natural rubber from latex

8.13 List the Characteristics of natural rubber

8.14 Explain the process of Vulcanization

8.15 List the Characteristics of Vulcanized rubber

8.16 Define the term Elastomer

8.17 Describe the preparation and uses of the following synthetic rubbers a) Butyl rubber, b) Buna-s and c) Neoprene rubber

9.0 Fuels

9.1 Define the term fuel

9.2 Classify the fuels based on physical state – solid, liquid and gaseous fuels with examples.

9.3 Classify the fuels based on occurrence- primary and secondary fuels with examples.

9.4 List the characteristics of a good fuel.

9.5 State the composition and uses of the following gaseous fuels:
a) water gas, b) producer gas, c) natural gas, d) coal gas, e) Bio gas and f) acetylene

B. ENVIRONMENTAL STUDIES

1.1 Define the term environment

1.2 Explain the scope and importance of environmental studies

1.3 Define and understand the following terms 1).Lithosphere, 2).Hydrosphere, 3).Atmosphere, 4).Biosphere, 5)Pollutant, 6).Contaminant 7) Pollution 8)Receptor 9)Sink 10) Particulates, 11)Dissolved oxygen(DO), 12).Threshold limit value(TLV), 13).BOD, and 14).COD

1.4 Explain the growing energy needs

1.5 Explain renewable(non-conventional) and non renewable(conventional) energy sources with examples.

1.6 Define an Ecosystem. Understand biotic and abiotic components of ecosystem.

1.7 Define the terms:

1). Producers, 2). Consumers and 3). Decomposers with examples.

1.8 Explain biodiversity and threats to biodiversity

1.9 Define air pollution

1.10 Classify the air pollutants- based on origin and states of matter

1.11 Explain the causes of air pollution

1.12 Explain the uses and over exploitation of forest resources

1.13 Define and explain deforestation

1.14 Explain the effects of air pollution on human beings, plants and animals

1.15 Explain the green house effect - ozone layer depletion and acid rain

1.16 Explain the methods of control of air pollution

1.17 Define water pollution

1.18 Explain the causes of water pollution

1.19 Explain the effects of water pollution on living and non living things

1.20 Understand the methods of control of water pollution.

COURSE CONTENT

A. ENGINEERING CHEMISTRY

1. Fundamentals of Chemistry

Atomic Structure: Introduction - Fundamental particles – Bohr's theory – Quantum numbers - Aufbau principle - Hund's rule - Pauli's exclusion Principle- Orbitals, shapes of s, p and d orbitals - Electronic configurations of elements

Chemical Bonding: Introduction – Valency, types of chemical bonds – Ionic, covalent and co-ordinate covalent bond with examples – Properties of Ionic and Covalent compounds

Oxidation-Reduction: Concepts of Oxidation-Reduction, Oxidation Number-calculations,

2. Solutions

Introduction-concentration terms – Mole concept, Molarity, Normality- Molecular weight, Equivalent weights, Numerical problems on Mole, Molarity and Normality

3. Acids and Bases

Introduction – theories of acids and bases and limitations – Arrhenius theory-Bronsted –Lowry theory – Lewis acid base theory – Ionic product of water – pH and related numerical problems – buffer solutions –Applications.

4. Principles of Metallurgy

Characteristics of Metals and distinction between Metals and Non Metals, Metallurgy, ore, Gangue, Flux, Slag - Concentration of Ore –Froth floatation - Methods of Extraction of crude Metal – Roasting, Calcination, Smelting – Alloys – Composition and uses of Brass, German silver and Nichrome

5. Electrochemistry

Conductors, insulators, electrolytes - Arrhenius theory of electrolytic dissociation – electrolysis – Faraday's laws of electrolysis- numerical problems – Galvanic cell –

standard electrode potential – electro chemical series –emf and numerical problems on emf of a cell

6. Corrosion

Introduction - factors influencing the rate of corrosion - electrochemical theory of corrosion - composition, stress and concentration cells– rusting of iron and its mechanism – prevention of corrosion by coating methods, cathodic protection

7. Water technology

Introduction –soft and hard water – causes of hardness – types of hardness –disadvantages of hard water – degree of hardness (ppm) – softening methods – permutit process – ion exchange process – numerical problems related to degree of hardness – drinking water – municipal treatment of water for drinking purpose – Osmosis, Reverse Osmosis - advantages of Reverse osmosis

8. Polymers

Introduction – polymerization – types of polymerization – addition, condensation with examples – plastics – types of plastics – advantages of plastics over traditional materials – Disadvantages of using plastics – preparation and uses of the following plastics: 1. Polytehene 2. PVC 3. Teflon 4. Polystyrene 5. Urea formaldehyde 6. Bakelite – Rubber – Natural rubber – processing from latex –Vulcanization – Elastomers – Butyl rubber, Buna-s, Neoprene rubber and their uses.

9. Fuels

Definition and classification of fuels – characteristics of good fuel - composition and uses of gaseous fuels- a) water gas,b) producer gas, c) natural gas, d) coal gas, e) Bio gas and f) acetylene

B. ENVIRONMENTAL STUDIES

Introduction – environment –scope and importance of environmental studies important terms – renewable and non renewable energy sources – Concept of ecosystem, producers, consumers and decomposers – Biodiversity, definition and threats to Biodiversity.

air pollution - causes-Effects – forest resources : uses and over exploitation, deforestation, acid rain, green house effect –ozone depletion – control of air pollution – Water pollution – causes – effects – control measures,

REFERENCE BOOKS

1. Intermediate chemistry Vol 1&2 Telugu Acedemy
2. Engineering Chemistry Jain & Jain
3. Engineering Chemistry O.P. Agarwal, Hi-Tech.
4. Engineering Chemistry Sharma
5. Engineering Chemistry A.K. De

ENGINEERING MECHANICS

Subject Title : Engineering Mechanics
Subject Code : C-105
Periods/Week : 04
Periods/Semester : 120

TIME SCHEDULE

S. No.	Major Topics	No. of Periods	Weightage of marks	Short Answer Type	Essay Type
1.	Introduction	06	04	02	---
2.	Forces & Moments	30	28	04	02
3.	Centroid	18	16	03	01
4.	Moment of Inertia	30	30	05	02
5.	Simple Stresses and Strains	36	42	06	03
	Total	120	120	20	08

OBJECTIVES

Upon completion of the course the student shall be able to

1.0 Understand the basic concepts of Engineering Mechanics

1.1 Define Mechanics and Engineering Mechanics
1.2 State the applications of Engineering Mechanics
1.3 State the branches of Engineering Mechanics
1.3 Define the terms 1.Statics 2.Dynamics 3.Kinetics 4.Kinematics
1.4 State the systems of measurements and Units
1.5 State S.I and M.K.S units of physical quantities used in Civil Engineering

2.0 Understand the concept Equilibrium of Co-Planar forces

2.1 Define the following terms
1. Force
2. Moment
3. Resultant
4. Equilibrium of forces
5. Equilibrant
6. Moment of a couple

2.2 Distinguish between
2.2.1 Scalar and Vector quantities
2.2.2 Co-planar and Non co-planar forces
2.2.3 Parallel and non-parallel forces
2.2.4 Like and unlike parallel forces

2.3 Compute the resultant of two co-planar forces acting at a point by
2.3.1 Law of parallelogram of forces
2.3.2 Triangle law of forces

2.4 Explain 'Lami's Theorem'.
2.41 Solve simple problems using Lami's Theorem

2.5 Solve problems on computation of the resultant of a system of coplanar concurrent forces by
2.5.1 Law of polygon of forces
2.5.2 Resolution of forces

2.6. Solve problems on computation of the resultant of a system of coplanar parallel forces.
2.7. Explain the properties of a couple.
2.8. State the conditions of equilibrium of rigid body subjected to a number of co- planar forces.
2.8.1. Determine resultant of co-planar concurrent forces by analytical methods.
2.9 List various types of supports (like Simple support, fixed support, hinged support, roller support)
2.10 List various types of beams (like simply supported beams, cantilever, fixed beams, over hanging beams, continuous beams)
2.11 List various types of loading (like point load, uniformly distributed load, uniformly varying load
2.12 To determine support reactions for simply supported beams with point loads and uniformly distributed loads

3.0 Understand the Centroid

3.1 Define Centroid and Centre of gravity
3.2 Distinguish between Centroid and Centre of gravity
3.3 State the need for finding the Centroid and Centre of gravity for various engineering applications
3.4 Calculate the positions of Centroid for simple plane figures from first principles
3.5 Explain the method of determining the Centroid by 'Method of moments'
3.6 Determine the position of Centroid of standard sections-T, L, I, Channel section, Z section, unsymmetrical I section
3.7 Determine the position of Centroid of built up sections consisting of RSJ'S, flange plates and Plane figures having hollow portions

4.0 Compute the Moment of Inertia and radius of gyration

4.1 Define Moment of Inertia (MI), Polar Moment of Inertia, Radius of gyration
4.2 State the necessity of finding Moment of Inertia for various engineering applications
4.3 Determine Moment of Inertia and Radius of gyration for regular geometrical sections like T, L, I, Channel section, Z section, unsymmetrical I section
4.4 State 1. Parallel axes theorem 2. Perpendicular axes theorem to determine MI
4.5 Determine MI of standard sections by applying Parallel axes theorem.
4.6 Determine MI of built-up sections by applying Parallel axes theorem.
4.7 Calculate radius of gyration of standard sections.
4.8 Determine the polar M.I for solid and hollow circular section applying Perpendicular axes theorem.

5.0 Calculate the simple Stresses and Strains in structural materials

5.1 Define the following terms
1. Stress
2. Strain
3. Modulus of Elasticity
4. Longitudinal Strain
5. Lateral Strain
6. Poisson's ratio
7. Modulus of rigidity
8. Bulk Modulus
9. Working stress
10. Factor of safety
11. Resilience
12. Strain Energy
13. Proof resilience and
14. Modulus of Resilience

5.2 Distinguish between different kinds of stresses and strains.
5.3 Draw the stress-strain curve for ductile materials (Mild steel) and hence explain the salient points in the curve.
5.4 State Hooke's law and limit of proportionality.

5.5 Solve problems on relationship between simple stress and simple strain under axial loading on uniform bars and stepped bars.
5.6 State the relationship among the elastic constants.
5.7 Solve problems on relationship between elastic constants.
5.8 Calculate stresses in simple and composite members under axial loading
5.9 Explain temperature stress, strain, hoops stress, temperature stresses in composite sections.
5.10 Calculate instantaneous stress and strain Energy due to dynamic loads and impact loading.
5.11 Explain the mechanical properties of materials

COURSE CONTENT

1. Introduction

Mechanics-Engineering Mechanics-Applications and branches of Engineering Mechanics- Statics, Dynamics, Kinetics and Kinematics- Systems of measurements and Units- S.I and M.K.S units of physical quantities used in Civil Engineering

2. Forces & Moments

a) Definition of force - vectors and scalars - vector representation of a force - systems of forces - co-planar forces.
b) Resultant of forces at a point – Parallelogram Law and Triangle Law of forces – Lami's theorem – Polygon law of forces – Resolution of forces.
c) Parallel forces – like and unlike – moment of force -its units and sense-couple-moment of a couple – properties of a couple.
d) Conditions of equilibrium of a rigid body subjected to a number of co-planar forces.
e) Structural members supporting co - planar forces- Types of supports- Types of beams - Types of loading - Determination of support reactions for simply supported beams with point loads and uniformly distributed loads

3. Centroid

a) Definitions – Centroid, Centre of gravity
b) Position of Centroid of standard figures like rectangle, triangle, parallelogram circle, semi-circle and trapezium.
c) Determination of location of Centroid of standard sections- T, L, I, Channel section, Z section,built up sections consisting of RSJs & flange plates and plane figures having hollow portion.

4. Moment of Inertia

a) Definition of Moment of Inertia
b) Perpendicular and parallel axes theorems
c) Moment of Inertia of standard sections like rectangle, triangle, circle and hallow circular sections
d) Moment of Inertia of built up sections- T, L, I, Channel section, and Z sections using parallel axis theorem
e) Moment of Inertia and radius of gyration of built-up sections consisting of the combinations of RSJ's & flange plates, channels & flange plates etc.
f) Polar Moment of Inertia of solid and hollow circular sections using Perpendicular axis theorem

5. Simple Stresses and Strains

a) Stress and strain – type of stresses and strains
b) Stress strain curves for ductile materials- mild steel, Elastic limit, Limit of proportionality, Yield point, Ultimate stress, Breaking stress, Working stress and Factor of safety.
c) Hooke's law – Young's modulus – deformation under axial load.
d) Shear stress and Shear Strain – Modulus of rigidity.

e) Longitudinal and lateral strain - Poisson's ratio, Bulk Modulus – relationship between elastic constants (proof not required, only problems).
f) Composite sections – effect of axial loads
g) Temperature stresses and strains – hoop stress - Temperature stresses in composite sections
h) Resilience – strain energy-proof resilience and modulus of resilience – maximum instantaneous stress due to gradual, sudden and shock loading.
i) Mechanical properties of materials - elasticity, plasticity, ductility, brittleness, malleability, stiffness, hardness, toughness, creep, fatigue- examples of materials which exhibit the above properties.

REFERENCE BOOKS

1. Engineering Mechanics – N. H.Dubey (Tata Mc Graw Hill)
2. Engineering Mechanics - R.S.Kurmi
3. Engineering Mechanics - P.K. Abdul Latheef
4. Engineering Mechanics & Statics - Dayaratnam
5. Engineering Mechanics - N. Srinivasulu,

SURVEYING – I

Subject Title : Surveying – I
Subject Code : C-106
Periods/Week : 04
Periods/Year : 120

TIME SCHEDULE

S. No.	Major Topics	No. of Periods	Weightage of marks	Short Answer Type	Essay type
1.	Introduction to Surveying	08	18	04	01
2.	Chain Surveying	34	32	06	02
3.	Compass Surveying	28	28	04	02
4.	Levelling	50	42	06	03
	Total	120	120	20	08

OBJECTIVES

Upon completion of the course the student shall be able to

1.0 Know the basic facts about Surveying

1.1 State the concept of surveying.
1.2 State the purpose of surveying.
1.3 Distinguish between Plane and Geodetic surveying.
1.4 List the units of linear and angular measurements in Surveying and conversions.
1.5 List the instruments used for taking linear and angular measurements.
1.6 Classify surveys based on different criteria
1.7 State the fundamental principles of surveying.
1.8 State and explain the stages of survey operations.

2.0 Understand the principles of Chain Surveying

2.1 State the purpose of Chain surveying.
2.2 State the principle of Chain surveying.
2.3 Explain the principles used in Chain triangulation.
2.4 List different instruments used in Chain Surveying.
2.5 Explain the functions of different instruments used in Chain Surveying.
2.6 List the points to be followed while selecting the survey stations
2.7 Define ranging
2.8 Explain the methods of ranging a line.
2.9 List the operations involved in chaining on 1. Flat ground, 2.Sloping ground
3. When high ground intervenes.
2.10 Describe in detail the method of setting out right angles
1. With or without Cross staff
2. Optical square.
2.11 Explain the
1. Field work procedure in Chain survey
2. Method of recording field observations.
2.12 Know the errors and mistakes in Chain surveying.
2.13 Determine the corrections for measurement due to incorrect length of chain.
2.14 Explain the methods of overcoming different obstacles in chain surveying.
2.15 Explain the method of preparing site plans by Chain Surveying.
2.16 Calculate the areas of irregular boundaries using
1. Average Ordinate rule
2. Trapezoidal rule

3. Simpson's rule.

3.0 Principles of Compass Surveying

3.1 State the purpose of Compass surveying.
3.2 State the principles and uses of Compass surveying.
3.2 Identify the parts of Prismatic Compass
3.3 Explain the functions of parts of Prismatic Compass
3.4 Define terms
1. Whole Circle Bearing
2. Quadrantal Bearing
3. True meridian
4. Magnetic meridian
5. True bearing
6. Magnetic bearing
7. Dip
8. Declination
9. Local attraction.
3.5 Convert Whole Circle Bearing into Quadrantal Bearing and vice versa.
3.6 Explain the effect of local attraction
3.7 Compute corrected bearings for local attraction.
3.8 Compute the included angles of lines in a Compass traverse.
3.9 Compute the true bearings of lines in a Compass traverse.
3.10 Explain the operations involved in field in compass Surveying
3.11 Explain methods of recording field notes.
3.12 Explain the method of plotting Compass Surveying.
3.13 Explain the method of plotting closed traverse and adjusting closing error by Bowditch rule.
3.14 List the errors in Compass surveying.

4.0. Understand the principles of levelling for different engineering purposes

4.1. Define levelling and list the types of levelling instruments
4.2. Define the important terms in levelling
4.3. List the component parts of a dumpy level and their functions
4.4. Explain the steps involved in Temporary adjustments of a dumpy level.
4.5. List various types of levelling staves
4.6. List the Errors in levelling
4.7. Enumerate natural and instrumental errors and Precautions to prevent errors
4.8. Tabulate the levelling field data
4.9. Compute reduced levels by height of instrument and Rise and fall methods, and apply check
4.10. Compare height of instrument and Rise and fall methods
4.11. State the effect of Errors due to curvature and refraction
4.12. Compute the Error due to curvature, refraction and combined error and the correction to be applied
4.13. Explain the types of Levelling
4.14. Describe in detail profile levelling and reciprocal levelling
4.15. List the errors eliminated in reciprocal levelling
4.16. Derive the formula for true difference in elevation and true error between two points in reciprocal levelling
4.17. Calculate true difference in elevation and collimation error in reciprocal levelling
4.18. List the fundamental lines of dumpy level and state the relationship among them
4.19. Explain permanent adjustments of a dumpy level (one peg method-theory only)

COURSE CONTENT

1.0 Classification and Principles of Surveying

Concept of Surveying - purpose of Surveying - Divisions of surveying- Classification of Surveying based on different criteria– Fundamental principles in Surveying -Measurements- Units and

conversions-Instruments used for taking linear and angular measurements- Stages of survey operations-Field work, Office work, Care and adjustments of the instruments.

2.0 Chain Surveying

a) Purpose and Principle of Chain Surveying -Suitability of Chain Surveying-Survey stations and their selection-Survey lines and offsets – Instruments used in Chain survey and their function

b) Ranging a survey line- direct ranging and Indirect ranging – Line ranger Chaining a line – Duties of leader and follower- Chaining on a sloping ground-Errors and mistakes in ordinary chaining -Correction due to incorrect length of Chain- problems

c) Different operations in Chain Surveying- Setting out right angles with cross staff and Optical square- Cross staff survey - Field work procedure- Recording field notes – field book - Conventional signs.

d) Obstacles in chaining-methods to overcome obstacles-Problems

e) Calculations of area – different methods –Average ordinate, Trapezoidal and Simpson's rules.

3.0 Compass Surveying

a) Introduction, Purpose, principle and uses of compass Survey-Traverse-Open and Closed Traverse –Theory of magnetism-Description working and use of Prismatic compass - Operations in using Compass before taking readings

b) Concept of Meridian-Types of meridians - Bearing and angle- Designation of bearings-Whole Circle Bearing, Quadrantal Bearing -Conversions

c) Field work in Compass Survey –field notes-traverse using prismatic compass.

d) Local attraction-detection and correction, Dip and Magnetic declination- Variation of Magnetic declination -calculation of true bearings-Determination of included angles from the given bearings and vice versa in compass traverse.

e) Plotting of Compass traverse - closing error and adjustment by Bowditch graphical method.

f) Precautions in using a compass - Errors in Compass Surveying.

4.0 Levelling

a) Levelling – Types of levelling instruments – component parts of a dumpy level and their functions – Definitions of important terms used in Levelling – level surface, level line, plumb line, horizontal line, axis of telescope, line of collimation, back sight, fore sight, intermediate sight, station and change point – Temporary adjustments of a dumpy level – types of Levelling Staves

b) Bench marks – different types of bench marks

c) Booking of readings in field book – Determination of Reduced levels by height of instrument and Rise and Fall methods – Comparison of methods – Problems.

d) Errors in levelling – natural and instrumental errors – Precautions

e) Errors due to curvature and refraction and combined correction – problems

f) Classification of Levelling – detailed description of profile levelling and reciprocal levelling – Problems on Reciprocal levelling.

g) Permanent adjustments of a dumpy level (one peg method-theory only)

REFERENCE BOOKS

1. Surveying - N.N.Basak - Tata Mc Graw Hill
2. Surveying Vol-I - S.K.Duggal -Mc Graw Hill Edn (India) Pvt Ltd
3. Surveying and levelling Vol –1 - Kulkarni and Kanetkar
4. Surveying and Levelling Vol. – 1 - B.C. Punmia
5. Surveying and Levelling - Vol –1 - R.Agor- Khanna Publishers

ENGINEERING DRAWING

Subject Title : Engineering Drawing
Subject Code : C–107
Periods/Week : 06
Periods Per Year : 180

TIME SCHEDULE

S.No	Major Topics	Minimum No. of Drawing plates	Periods	Weightage of Marks	Short Answer Questions	Essay type Questions
1	Importance of Engineering Drawing	--	01	-	-	-
2	Engineering Drawing Instruments	01	05	-	-	-
3	Free hand lettering & Numbering	01	06	5	1	-
4	Dimensioning Practice	01	09	5	1	-
5	Geometrical constructions	05	21	15	1	1
6	Projection of points, Lines, Planes & Solids	03	21	10	-	1
7	Auxiliary views	02	06	5	1	-
8	Sectional views	02	21	10	-	1
9	Orthographic Projection	04	36	10	-	1
10	Pictorial drawing	02	30	10	-	1
11	Development of surfaces	03	24	10	-	1
Total		**24**	**180**	**80**	**04**	**06**

NOTE: The numbers of plates mentioned above are minimum. The actual number may be increased based on the need
The Course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation

Pre-Requisite: Clear visualization and sound pictorial intelligence

OBJECTIVES
Upon completion of the subject, the student shall be able to

1.0 Understand the basic concepts of Engineering Drawing

1.1 State the importance of drawing as an engineering communication medium
1.2 State the necessity of B.I.S. Code of practice for Engineering Drawing.
1.3 Explain the linkages between Engineering drawing and other subjects of study in diploma course.

2.0 Use of Engineering Drawing Instruments

2.1 Select the correct instruments and draw lines of different orientation.
2.2 Select the correct instruments and draw small and large Circles.
2.3 Select the correct instruments for measuring distances on the drawing.
2.4 Use correct grade of pencil for different types of lines, thickness and given function.
2.5 Select and use appropriate scales for a given application.
2.6 Identify different drawing sheet sizes as per I.S. and Standard Lay- outs.
2.7 Prepare Title block as per B.I.S. Specifications.
2.8 Identify the steps to be taken to keep the drawing clean and tidy.

Drawing Plate 1: (2 exercises)

3.0 Write Free Hand Lettering and Numbers

3.1 Write titles using inclined lettering and numerals of 7mm, 10mm and 14mm height
3.2 Write titles using vertical lettering and numerals of 7mm, 10mm and 14mm height
3.3 Select suitable sizes of lettering for different layouts and applications
3.4 Practice the use of lettering stencils.

Drawing plate 2: (6 exercises)

4.0 Understand Dimensioning Practice

4.1 Define “Dimensioning.
4.2 State the need of dimensioning the drawing according to accepted standard.
4.3 Identify notations of Dimensioning used in dimensioned drawing.
4.4 Identify the system of placement of dimensions in the given Dimensioned drawing.
4.5 Dimension a given drawing using standard notations and desired System of dimensioning.
4.6 Dimension standard features applying necessary rules.
4.7 Arrange dimensions in a desired method given in a drawing.
4.8 Identify the deviations if any made in the given dimensioned drawing with reference to SP-46-1988, and dimension the same correctly.

Drawing Plate 3: (10 exercises)

5.0 Apply Principles of Geometric Constructions

5.1 Divide a given line into desired number of equal parts internally.
5.2 Draw tangent lines and arcs.
5.3 Use General method to construct any polygon.
5.4 Explain the importance of conics
5.5 Construct conics (ellipse, parabola and hyperbola) by general method
5.6 Construct ellipse by concentric circles method
5.7 Construct parabola by rectangle method
5.8 Construct rectangular hyperbola from the given data.
5.9 Construct involute from the given data.
5.10 Construct cycloid and helix from the given data.
5.11 State the applications of the above constructions in engineering practice.

Drawing Plate -4: Problems up to construction Tangents and Arcs
Drawing Plate -5: problems on construction of polygon
Drawing Plate -6: problems on construction of conics
Drawing Plate -7 & 8: Problems on construction of involute, cycloid and helix

6.0 Apply Principles of Projection of points, lines, planes & solids

6.1 Visualize the objects
6.2 Explain the First angle and Third angle projections
6.3 Practice the First angle projections
6.4 Draw the projection of a point with respect to reference planes (HP&VP)
6.5 Draw the projections of straight lines with respect to two reference Planes (up to lines parallel to one plane and inclined to other plane)
6.6 Draw the projections of planes (up to planes perpendicular to one plane and inclined to other plane)
6.7 Draw the projections of solids (up to axis of solids parallel to one plane and inclined to other plane)

Drawing Plate -9: Problems up to projection of points and Lines (15 exercises)
Drawing Plate -10: Problems of projection of planes (6 exercises)
Drawing Plate -11: Problems of projection of solids (10 exercises)

7.0 Understand the need of auxiliary views

7.1 State the need of Auxiliary views for a given engineering drawing.
7.2 Draw the auxiliary views of a given engineering component
7.3 Differentiate between auxiliary view and apparent view

Drawing plate No.12 &13: (10 exercises)

8.0 Appreciate the need of Sectional Views

8.1 Explain the need to draw sectional views.
8.2 Select the section plane for a given component to reveal maximum information.
8.3 Explain the positions of section plane with reference planes
8.4 Differentiate between true shape and apparent shape of section
8.5 Draw sectional views and true sections of regular solids discussed in **6.0**
8.6 Apply principles of hatching.

Drawing Plate–14 & 15: (6 exercises)

9.0 Apply principles of orthographic projection

9.1 Explain the principles of orthographic projection with simple sketches.
9.2 Draw the orthographic view of an object from its pictorial drawing.
9.3 Draw the minimum number of views needed to represent a given object fully.

Drawing Plate 16,17,18 &19 : (16 exercises)

10.0 Prepare pictorial drawings

10.1 State the need of pictorial drawings.
10.2 Differentiate between isometric scale and true scale.
10.3 Prepare Isometric views for the given orthographic drawings.

Drawing plate 20 & 21: (12 exercises)

11.0 Interpret Development of surfaces of different solids

11.1 State the need for preparation of development of surfaces and solids..
11.2 Prepare development of simple engineering objects (cubes, prisms, cylinders, cones, pyramid) using parallel line and radial line method.

11.3 Prepare development of surface of engineering components like trays, funnel, 90^0 elbow & rectangular duct.

Drawing plate No. 22,23 &24 : (10 exercises)

Key competencies to be achieved by the student

S.No	Major topic	Key Competency
1.	Importance of Engineering Drawing	• Explain the linkages between Engineering drawing and other subjects of study in Diploma course.
2.	Engineering Drawing Instruments	• Select the correct instruments to draw various entities in different orientation
3.	Free hand lettering & Numbering	• Write titles using inclined and vertical lettering and numerals as per B.I.S (Bureau of Indian standards)
4.	Dimensioning Practice	• Dimension a given drawing using standard notations and desired system of dimensioning
5.	Geometrical construction	• Construct ellipse, parabola, rectangular hyperbola, involute, cycloid and helix from the given data.
6.	Projection of points, Lines, Planes & Solids	• Draw the projection of a point, straight lines, planes & solids with respect to reference planes (HP& VP)
7.	Auxiliary views	• Draw the auxiliary views of a given Engineering component • Differentiate between Auxiliary view and apparent view
8.	Sectional views	• Differentiate between true shape and apparent shape of section • Use conventional representation of Engineering materials as per B.I.S. Code. • Apply principles of hatching. • Draw simple sections of regular solids
9.	Orthographic Projection	• Draw the minimum number of views needed to represent a given object fully.
10.	Pictorial drawing	• Differentiate between isometric scale and true scale. • Draw the isometric views of given objects,.
11.	Development of surfaces	• Prepare development of Surface of Engineering components like trays, funnel, 90^0 elbow & rectangular duct.

COURSE CONTENT

NOTE

1. **B.I.S Specification should invariably be followed in all the topics.**
2. **A-3 Size Drawing Sheets are to be used for all Drawing Practice Exercises.**

1.0 The importance of Engineering Drawing

Explanation of the scope and objectives of the subject of Engineering Drawing Its importance as a graphic communication -Need for preparing drawing as per standards – SP-46 –1988 – Mention B.I.S - Role of drawing in -engineering education – Link between Engineering drawing and other subjects of study.

2.0 Engineering drawing Instruments

Classifications: Basic Tools, tools for drawing straight lines, tools for curved lines, tools for measuring distances and special tools like mini drafter & drafting machine – Mentioning of names under each classification and their brief description -Scales: Recommended scales reduced & enlarged -Lines: Types of lines, selection of line thickness - Selection of Pencils -Sheet Sizes: A0, A1, A2, A3, A4, A5, Layout of drawing sheets in respect of A0, A1, A3 sizes, Sizes of the Title block and its contents - Care and maintenance of Drawing Sheet, Drawing plate:

Lay out of sheet – as per SP-46-1988 to a suitable scale.

Simple Exercises on the use of Drawing Instruments. Importance of Title Block.

3.0 Free hand lettering & numbering

Importance of lettering – Types of lettering -Guide Lines for Lettering

Practicing of letters & numbers of given sizes (7mm, 10mm and 14mm)

Advantages of single stroke or simple style of lettering - Use of lettering stencils

4.0 Dimensioning practice

Purpose of engineering Drawing, Need of B.I.S code in dimensioning -Shape description of an Engineering object -Definition of Dimensioning size description -Location of features, surface finish, fully dimensioned Drawing - Notations or tools of dimensioning, dimension line extension line, leader line, arrows, symbols, number and notes, rules to be observed in the use of above tools -Placing dimensions: Aligned system and unidirectional system (SP-46-1988)-Arrangement of dimensions Chain, parallel, combined progressive, and dimensioning by co-ordinate methods-The rules for dimensioning standard features of Circles (holes) arcs, angles, tapers, chamfers and dimension of narrow spaces.

5.0 Geometric Constructions

Division of a line: to divide a straight line into given number of equal parts

Examples in engineering application.

Construction of tangent lines: to draw tangent lines touching circles internally and externally.

Construction of tangent arcs

i) To draw tangent arc of given radius touching two lines inclined at given angle (acute, right and obtuse angles).

ii)Tangent arc of given radius touching a circle or an arc and a given line.

iii)Tangent arcs of radius R, touching two given circles internally and externally.

Construction of polygon: Construction of any regular polygon of given side length using general method

Conics: Explanation of Ellipse, Parabola, Hyperbola, as sections of a cone and loci of a moving point, Eccentricity of above curves – Their Engg. application viz. Projectiles, reflectors, P-V Diagram of a Hyperbolic process,
Construction of any conic section of given eccentricity by general method
Construction of ellipse by concentric circles method
Construction of parabola by rectangle method
Construction of rectangular hyperbola
General Curves: Involute, Cycloid and Helix, explanations as locus of a moving point, their engineering application, viz, Gear tooth profile, screw threads, springs etc. - their construction

6.0 Projection of points, lines and planes & solids

Projecting a point on two planes of projection -Projecting a point on three planes of projection -Projection of straight line.
(a) Parallel to both the planes.
(b) Perpendicular to one of the planes.
(c) inclined to one plane and parallel to other planes

Projection of regular planes
(a) Plane perpendicular to HP and parallel to VP and vice versa.
(c) Plane perpendicular to HP and inclined to VP and vice versa.

Projection of regular solids
(a) Axis perpendicular to one of the planes
(b) Axis parallel to VP and inclined to HP and vice versa.

7.0 Auxiliary views

Need for drawing auxiliary views -Explanation of the basic principles of drawing an auxiliary views explanation of reference plane and auxiliary plane - Partial auxiliary view.

8.0 Sectional views

Need for drawing sectional views – what is a sectional view - Location of cutting plane – Purpose of cutting plane line – Selection of cutting plane to give maximum information (vertical and offset planes) - Hatching – Section of regular solids inclined to one plane and parallel to other plane

9.0 Orthographic Projections

Meaning of orthographic projection -Using a viewing box and a model – Number of views obtained on the six faces of the box, - Legible sketches of only 3 views for describing object -Concept of front view, top view, and side view sketching these views for a number of engg objects - Explanation of first angle projection. – Positioning of three views in First angle projection - Projection of points as a means of locating the corners of the surfaces of an object – Use of miter line in drawing a third view when other two views are given -Method of representing hidden lines -Selection of minimum number of views to describe an object fully.

10.0 Pictorial Drawings

Brief description of different types of pictorial drawing viz., Isometric, oblique, and perspective and their use - Isometric drawings: Iso axis, angle between them, meaning of visual distortion in dimensions - Need for an isometric scale, difference between Isometric scale, and ordinary scale difference between Isometric view and Isometric projection - Isometric and non-Isometric lines -Isometric drawing of

common features like rectangles, circular - shapes, non-isometric lines - Use of box and offset methods

11.0 Development of Surfaces

Need for preparing development of surface with reference to sheet metal work -Concept of true length of a line with reference to its orthographic projection when the line is (i) parallel to the plane of projection (ii) inclined to one principal and parallel to the other -Development of simple solids like cubes, prisms, cylinders, cones, pyramid (sketches only) -Types of development: Parallel line and radial line development -Procedure of drawing development, drawings of trays, funnels, 90^0 elbow pipes and rectangular ducts.

REFERENCE BOOKS

Engineering Graphics by P I Varghese – (McGraw-hill)
Engineering Drawing by Basant Agarwal & C.M Agarwal - (McGraw-hill)
Engineering Drawing by N.D.Bhatt.
T.S.M. & S.S.M on " Technical Drawing" prepared by T.T.T.I., Madras.
SP-46-1998 – Bureau of Indian Standards.

SURVEYING PRACTICALS - I

Subject Title : Surveying practicals-I
Subject Code : C-108
Periods/Week : 06 (4+2)
Periods/Year : 180

TIME SCHEDULE

S. No.	Major Topics	No. of Periods
1.	Chain surveying	54
2.	Compass Surveying	30
3.	Levelling	60
4.	Plotting	36
	Total	180

OBJECTIVES

Upon completion of the course, the student shall be able to

1.0 Apply standard practices to perform chain survey in the field and to plot from field data

1.1 Practice unfolding and folding a chain.
1.2 Perform direct ranging on level ground and measure the distance between two given stations and record the measurements in the field book..
1.3 Perform direct ranging on level ground and measure the distance between two given stations using line ranger.
1.4 Perform indirect ranging and measure the distance between two given stations when a high ground intervenes to prevent intervisibility of ends of line.
1.5 Set out a right angle to a given chain line by using chain only.
1.6 Set and measure offsets for a given chain line by
1. Perpendicular offsets 2.Oblique offsets.
1.7 Perform triangulation survey of a given area with chain and cross staff and record all necessary nearby details.
1.8 Calculate the area bounded by the given points by chain triangulation and compare the result with the area calculated from plotting.
1.9 Carry out chain survey to overcome obstacles like pond, building etc and plot the Survey from field book measurements.
1.10 Carry out chain traversing to survey an area bounded by more than three stations and plot the Survey from field book measurements.

2.0 Apply principles to perform compass survey and plot from field data

2.1 Identify the parts of a prismatic Compass
2.2 Set up the compass at a station and carry out temporary adjustments.
2.3 Take bearings of two points from instrument station and calculate the included angle.
2.4 Perform an open compass survey with Compass and Chain.
2.5 Perform a closed traverse with compass and chain.
2.7 Plot the closed traverse from field data and adjust for closing error by Bowditch rule.
2.8 Determine the area bounded by the given points by the method of Radiation.
2.9 Determine the distance between two accessible points involving single setting of the instrument.

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3.0 Perform different methods of levelling

3.1 Identify the component parts of a dumpy level / Auto level
3.2 Study different types of levelling staves

3.3 Perform temporary adjustments of a dumpy level / Auto level for taking observations
3.4 Practice taking staff readings and recording them in level field book
3.5 Take staff readings for differential levelling and compute the difference in elevation between two stations (take invert levels also)
3.6 Conduct fly levelling and determine RLs of required stations
3.7 Determine the true difference in elevation between two far off stations by conducting reciprocal levelling
3.8 Determine the collimation error of a dumpy level by conducting reciprocal levelling
3.9 Conduct profile levelling along a route and compute the RLs at various stations
3.10 Conduct profile levelling by taking cross sections across a route and compute the RLs at various stations
3.11 Conduct profile levelling along a route by taking readings along both LS and CS and compute the RLs

4.0 Apply principles of mapping from the field work and plot from the field work measurements.

4.1 Understand the importance and relation between field work and plotting.

Key competencies to be achieved by the student

S.No	Experiment title	Competencies	Key competencies
1	a) Practice unfolding and folding of a chain b) Ranging a survey line by direct ranging and determine the distance between two points	a) Hold both the handles in the left hand and throwing the chain swiftly with the right hand in the forward direction. b) Fixing the ranging rod vertically in the ground c) Range by eye	---
2	a) Range a survey line by a line ranger b) Range a survey line by indirect ranging and determining the distance between two points	a) Move the instrument backward and forward at right angles to the line until two images appear one above the other exactly in the same vertical line. b) Observe the images of the ranging rods A and B in upper and lower prisms at the same time. c) Ensure the ranging rods at end stations are visible from the selected intermediate positions	Move the instrument backward and forward at right angles to the line until two images appear one above the other exactly in the same vertical line.
3	Set and measure perpendicular and oblique offsets	a) Measure the chainage accurately b) Hold the cross staff vertically and viewing both the slits to coincide with chain line and object line c) Measure the length of Oblique offsets accurately.	Hold the cross staff vertically and viewing both the slits to coincide with chain line and object line
4	Calculate area of a given boundary by Cross staff	a) Run the chain line through the centre of the	Take perpendicular and oblique offsets

	survey	field. b) Take perpendicular and oblique offsets	
5	Perform triangulation survey of a given area with chain and cross staff.	a) Measure the length of base line accurately b) Measure the offsets correctly c) Record the field work observations correctly	a)Select the stations for full visibility b) Measure the length of base line accurately c) Accurately set the offsets
6	Perform chain traverse survey of a given area with chain and cross staff	a) Select main survey stations with clear intervisibility b) Measure the length of base line accurately c) Measure the offsets correctly d) Record the field work observations correctly	a) Select main survey stations with clear intervisibility b) Accurately set the offsets
7	Set up the compass at a station and carry out temporary adjustments	a)Fix the compass with tripod stand over the station b) Center the compass c) Level the compass	Centering the compass over the ground station
8	Taking bearings of the given traverse	a) Observe and record the bearings correctly b) Detect the local attraction, if any	Taking the bearings accurately
9	Perform an open traverse survey with Compass and Chain	a) Bisecting the object accurately with the cross hair b) Measure the fore and back bearings of the traverse legs by Prismatic compass after fixing the local magnetic meridian	Bisecting the object accurately with the cross hair
10	Perform a closed traverse survey with Compass and Chain and adjust for closing error by Bowditch method.	a) Bisecting the object accurately with the cross hair b) Measure the fore and back bearings of the traverse legs by Prismatic compass after fixing the local magnetic meridian	Bisecting the object accurately with the cross hair
11	Study of dumpy level / Auto level	Holding the instrument and fixing on tripod	Identifying parts and their functions
12	Study of levelling staves	Folding and unfolding operations, Observing reading to the accuracy of 5 mm,	Holding Levelling staff to the plumb while taking observation
13	Temporary adjustments of dumpy level	a) Spreading the tripod on ground properly for easy levelling and stability	Operation of foot screwsEyepiece adjustmentFocussing the object glass

14	Recording observations on level field book	Entering Back Sight, Fore Sight and Intermediate Sight in appropriate positions	Applying the methods of calculating reducing levels by Height of instument method and Rise and fall method Finding RL when staff is inverted Applying arithmatic check
15	Differential Levelling & Fly Levelling	Taking observations	Locating proper position of change point to avoid cumulative errors
16	Reciprocal Levelling	Taking observations	Taking observations
17	Profile levelling	Spreading chain along the required route	Taking readings at intervals along the route and cross sections

COURSE CONTENT

1. Chain Surveying

a) Practice unfolding and folding of a chain.
b) Ranging and chaining of lines on level ground and recording in field book to measure the distance between two stations.
c) Ranging a survey line using a line ranger
d) Chaining a line involving indirect ranging.
e) Setting and measuring the offsets-Perpendicular and Oblique offsets
f) Measurement of land areas –cross staff survey
g) Chain triangulation around the building covering a small area with other details taking offsets and recording.
h) Chain triangulation involving a road with other details taking offsets and recording.
i) Chain traversing to survey an area bounded by more than three stations.

2. Compass Surveying

a) Setting up the compass – observations of bearings
b) Calculation of included angles from the observed bearings
c) Traversing with prismatic compass and chain – open Traverse – Recording.
d) Traversing with prismatic compass and chain- closed traverse - recording.
e) Plotting the closed traverse from field data & adjust for closing error-Bowditch rule.
f) Determination of area bounded by the given points by the method of Radiation
g) Determination of the distance between two accessible points involving single setting of the instrument

3. Levelling

a) Study of dumpy level, levelling staves– performing Temporary adjustments of level.
b) Taking staff readings of various stations – booking of readings in level field book.
c) Differential and Fly levelling – calculation of reducing levels by height of collimation and Rise & Fall methods (inverted levels also)
d) Reciprocal levelling – True difference in elevation and collimation error.
e) Profile levelling-recording of readings in level field book and calculation of RLs.

4. Plotting:

1	Conventional signs in Surveying	1 Sheet
2	Plotting of perpendicular and oblique offsets	2 Sheets
3	Plotting of land surveys – Chain and cross-staff Surveying – Calculation of areas	2 Sheets
4	Plotting of chain triangulation & Surveying of small areas around Buildings	2 Sheets
5	Chain traversing to survey an area bounded by more than three stations	2 Sheets
6	Plotting of closed traverse by Compass surveying – location of Details and adjusting error by Bowditch method	1+1 Sheets
7	Plotting of open traverse by Compass surveying and locating details	1 Sheet
8	Compass survey by method of radiation - calculation of area	1 Sheet
9	Plot the LS and CS along a route from the data of profile levelling, mark the formation level by selecting suitable gradient, calculate the depth of cutting and filling	1 Sheet
	TOTAL	14 Sheets

PHYSICS LAB
(Common for all branches)

Subject Title : Physics Lab
Subject Code : C -109
Periods per week : 03
Total periods per year : 45

TIME SCHEDULE

S.No	Name of the Experiment	No. of Periods
1.	Hands on practice on Vernier Calipers	03
2.	Hands on practice on Screw gauge	03
3.	Verification of Parallelogram law of forces and Triangle law of forces	03
4.	Simple pendulum	03
5.	Velocity of sound in air – (Resonance method)	03
6.	Focal length and Focal power of convex lens (Separate & Combination)	03
7.	Refractive index of solid using traveling microscope	03
8.	Surface tension of liquid using traveling microscope	03
9.	Coefficient of viscosity by capillary method	03
10.	Boyle's law verification	03
11.	Meter bridge	03
12.	Mapping of magnet lines of force	03
	Revision	06
	Test	03
	Total:	**45**

Objectives:

Upon completion of the course the student shall be able to

1.0 Practice the Vernier caliper to determine the volume of a cylinder and sphere
2.0 Practice the Screw gauge to determine thickness of a glass plate and cross section of a wire
3.0 Verify the parallelogram law and Triangle law of forces.
4.0 Determine the value of acceleration due to gravity using Simple Pendulum and verify with L-T^2 graph.
5.0 Determine the velocity of sound in air at room temperature
6.0 Determine the Focal length and focal power of convex lenses using U-V and graphical method
7.0 Determine the refractive index of a solid using travelling microscope
8.0 Determine the surface tension of a liquid using travelling microscope
9.0 Determine the viscosity of a liquid using capillary method
10.0 Verify the Boyle's law employing a Quill tube
11.0 Determine the specific resistance of wire material using Meter Bridge
12.0 Practice the mapping of magnetic lines of force

Competencies and Key competencies to be achieved by the student

Name of the Experiment (No of Periods)	Competencies	Key competencies
1. Hands on practice on Vernier Calipers(03)	• Find the Least count • Fix the specimen in posit • Read the scales • Calculate the volume of given object	• Read the scales • Calculate the volume of given object
2. Hands on practice on Screw gauge(03)	• Find the Least count • Fix the specimen in posit • Read the scales • Calculate thickness of glass place and cross section of wire	• Read the scales • Calculate thickness of given glass plate • Calculate cross section of wire
3. Verification of Parallelogram law of forces and Triangle law of forces(03)	• Fix suitable weights • Note the positions of threads on drawing sheet • Find the angle at equilibrium point • Construct parallelogram • Compare the measured diagonal • Construct triangle • Find the length of sides • Compare the ratios	• Find the angle at equilibrium point • Constructing parallelogram • Construct triangle • Compare the ratios of force and length
4. Simple pendulum(03)	• Fix the simple pendulum to the stand • Adjust the length of pendulum • Find the time for number of oscillations • Find the time period • Calculate the acceleration due to gravity • Draw l-T and $l-T^2$ graph	• Find the time for number of oscillations • Find the time period • Calculate the acceleration due to gravity • Draw l-T and $l-T^2$ graph
5. Velocity of sound in air –Resonance method (03)	• Arrange the resonance apparatus • Adjust the reservoir level for booming sound • Find the first and second resonanting lengths • Calculate velocity of sound	• Adjust the reservoir level • Find the first and second resonanting lengths • Calculate velocity of sound • Calculate velocity of sound at 0^0 C

6. Focal length and Focal power of convex lens (Separate & Combination) (03)	• Fix the object distance • Find the Image distance • Calculate the focal length and power of convex lens and combination of convex lenses • Draw u-v and 1/u – 1/v curves	• Calculate the focal length and power of convex lens • Draw u-v and 1/u – 1/v graph
7. Refractive index of solid using traveling microscope(03)	• Find the least count of vernier on microscope • Place the graph paper below microscope • Read the scale • Calculate the refractive index of glass slab	• Read the scale • Calculate the refractive index of glass slab
8. Surface tension of liquid using traveling microscope(03)	• Find the least count of vernier on microscope • Focus the microscope to the lower meniscus & bent pin • Read the scale • Calculate height of liquid rise • Calculate the surface tension of water	• Read the scale • Calculate height of liquid rise • Calculate the surface tension of water
9. Coefficient of viscosity by capillary method(03)	• Find the least count of vernier • Fix the capillary tube to aspiratory bottle • Find the mass of collected water • Find the pressure head • Calculate rate of volume of liquid collected • Find the radius of capillary tube • Calculate the viscosity of water using capillary method	• Find the pressure head • Calculate rate of volume of liquid collected • Find the radius of capillary tube • Calculate the viscosity of water

Name of the Experiment	Competencies	Key competencies
10. Boyle's law verification (03)	• Note the atmospheric pressure • Fix the quill tube to retort stand • Find the length of air column • Find the pressure of enclosed air • Find and compare the calculated value P x l	• Find the length of air column • Find the pressure of enclosed air • Find the value P x l
11. Meter bridge(03)	• Make the circuit connections • Find the balancing length • Calculate unknown resistance • Find the radius of wire • Calculate the specific resistance	• Find the balancing length • Calculate unknown resistance • Calculate the specific resistance
12. Mapping of magnet lines of force(03)	• Draw magnetic meridian • Placed the bar magnet in NN and NS directions • Draw magnetic lines of force • Locate the neutral points along equatorial and axial lines	• Draw magnetic lines of force • Locate the neutral points along equatorial and axial lines

CHEMISTRY LAB

Subject Title	**:**	**Chemistry Lab**
Subject Code	**:**	**C -110**
Periods per week	**:**	**03**
Total periods per year	**:**	**45**
Curriculum	**:**	**C-16**

TIME SCHEDULE

S.No	Name of the Experiment	No. of Periods
1.	Familiarization of methods for Volumetric analysis	03
2.	Preparation of Std Na_2CO_3 solution and making solutions of different dilution	03
3.	Estimation of HCl solution using Std. Na_2CO_3 solution	03
4.	Estimation of NaOH using Std. HCl solution	03
5.	Estimation of H_2SO_4 using Std. NaOH solution	03
6.	Estimation of Mohr's Salt using Std. $KMnO_4$	03
7.	Determination of acidity of water sample	03
8.	Determination of alkalinity of water sample	03
9.	Determination of total hardness of water using Std. EDTA solution	03
10.	Estimation of Chlorides present in water sample	03
11.	Estimation of Dissolved Oxygen (D.O) in water sample	03
12.	Determination of pH using pH meter	03
13.	Revision	06
14	Practice Test	03
	Total:	**45**

Objectives:

Upon completion of the course the student shall be able to

1.0 Practice volumetric measurements (using pipettes, measuring jars, volumetric flask, burettes) and making dilutions, etc.
2.0 Practice making standard solutions with pre weighted salts and to make desired dilutions using appropriate techniques.
3.0 Conduct titrations adopting standard procedures and using Std. Na_2CO_3 solution for estimation of HCl
4.0 Conduct titrations adopting standard procedures and using Std. HCl solution for estimation of NaOH
5.0 Conduct titrations adopting standard procedures and using Std. NaOH solution for estimation of H_2SO_4
6.0 Conduct titrations adopting standard procedures and using Std. $KMnO_4$ solution for estimation of Mohr's Salt
7.0 Conduct titrations adopting standard procedures to determine the acidity of given samples of water (ground water and surface / tap water, and rain water if available)
8.0 Conduct titrations adopting standard procedures to determine the alkalinity of given

samples of water (ground water and surface / tap water)

9.0 Conduct titrations adopting standard procedures to determine the total hardness of given samples of water (ground water and surface / tap water) using Std. EDTA solution

10.0 Conduct titrations adopting standard procedures to determine the chlorides present in the given samples of water and waste water (ground water and surface / tap water)

11.0 Conduct the test using titrometric / electrometric method to determine Dissolved Oxygen (D.O) in given water samples (One sample from closed container and one from open container / tap water)

12.0 Conduct the test on given samples of water / solutions (like soft drinks, sewage, etc.) to determine their pH using standard pH meter

13.0 Revision

14.0 To conduct Test.

Competencies and Key competencies to be achieved by the student

Name of the Experiment (No of Periods)	Competencies	Key competencies
Familiarization of methods for Volumetric analysis (03)	--	--
Preparation of Std Na_2CO_3 and making different diluted solution (03)	▪ Weighting the salt to the accuracy of 0.001g ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduated pipette ▪ Making appropriate dilutions	▪ Weighting the salt to the accuracy of 0.001g ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduated pipette ▪ Making appropriate
Name of the Experiment (No of Periods)	**Competencies**	**Key competencies**
Estimation of HCl solution using Std. Na_2CO_3 solution (03)	▪ Cleaning the glassware and rinsing with appropriate solutions ▪ Making standard solutions ▪ Measuring accurately the standard solutions and titrants ▪ Filling the burette with titrant ▪ Fixing the burette to the stand ▪ Effectively Controlling the flow of the titrant	▪ Making standard solutions ▪ Measuring accurately the standard solutions and titrants ▪ Effectively Controlling the flow of the titrant ▪ Identifying the end point ▪ Making accurate observations
Estimation of NaOH using Std. HCl solution (03)		
Estimation of H_2SO_4 using Std. NaOH solution (03)		
Estimation of Mohr's Salt using Std. $KMnO_4$ (03)		
Determination of acidity of water sample (03)		
Determination of alkalinity of water sample (03)		
Determination of total hardness of water using Std. EDTA solution (03)		

Estimation of Chlorides present in water sample (03) Estimation of Dissolved Oxygen (D.O) in water sample (By titration method) (03)	▪ Identifying the end point ▪ Making accurate observations ▪ Calculating the results	
Determination of pH using pH meter (03)	▪ Familiarize with instrument ▪ Choose appropriate 'Mode' / 'Unit' ▪ Prepare standard solutions / buffers, etc. ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standard curve ▪ Make measurements accurately ▪ Follow Safety precautions	▪ Prepare standard solutions / buffers, etc. ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standard curve ▪ Make measurements accurately
Name of the Experiment (No of Periods)	**Competencies**	**Key competencies**
Revision (06) Practice Test (03)		▪ To prepare the student for practical examination

COMPUTER FUNDAMENTALS LAB
(Common to all Branches)

Subject Title : Computer Fundamentals Lab
Subject Code : C -111
Periods/Week : 03
Periods/Year : 90

List of Experiments:

S. No.	Major Topics	No. of sessions each of 3 periods duration	No. of Periods
I.	Computer hardware Basics	01	03
II.	Windows Operating System	02	06
III.	MS Word	09	27
IV.	MS Excel	09	27
V.	MS PowerPoint	09	27
	Total	30	90

Rationale: The knowledge of Computer usage has become a must for everyone, due to widespread computer usage and related applications in all fields. This laboratory is designed to give the students hands on practice of Windows Operating System and MS Office to enable the students to use these skills in future courses.

I. Computer Hardware Basics (Not for end examination)

1. a) To Familiarize with Computer system and hardware connections
   b) To start and Shut down Computer correctly
   c) To check the software details of the computer
2. To check the hardware present in your computer

II. Windows's operating system (Not for end examination)

3. To Explore Windows Desktop
4. Working with Files and Folders
5. Windows Accessories: Calculator – Notepad – WordPad – MS Paint

III. Practice with MS-WORD

6. To familiarize with Ribbon layout of MS Word
   Home - Insert - Page layout – References – Review - View
7. To practice Word Processing Basics
8. To practice Formatting techniques
9. To insert a table of required number of rows and columns
10. To insert Objects, Clipart and Hyperlinks
11. To use Mail Merge feature of MS Word
12. To use Equations and symbols features

IV. Practice with MS-EXCEL

13. To familiarize with MS-EXCEL layout

14. To access and Enter data in the cells
15. To edit a spread sheet- Copy, Cut, Paste, and selecting Cells
16. To use built in functions and Formatting Data
17. To create Excel Functions, Filling Cells
18. To enter a Formula for automatic calculations
19. To practice Excel Graphs and Charts
20. To format a Worksheet in Excel, Page Setup and Print

V. Practice with MS-POWERPOINT

21. To familiarize with Ribbon layout features of PowerPoint 2007.
22. To create a simple PowerPoint Presentation
23. To set up a Master Slide in PowerPoint
24. To insert Text and Objects
25. To insert a Flow Charts
26. To insert a Table
27. To insert a Charts/Graphs
28. To insert video and audio
29. To practice Animating text and objects
30. To Review presentation

Exp No.	Name of the Experiment	Competencies	Key Competencies
1 (a).	To familiarize with Computer system and hardware connections	a. Identify the Parts of a Computer system a). CPU b) Monitor c) CD/DVD Drive d) Power Switch e) Start Button f) Reset Button b. Identify and connect various peripherals c. Identify and connect the cables used with computer system d. Identify various ports on CPU and connect Keyboard & Mouse	Connect cables to external hardware and operate the computer
1 (b).	To Start and Shut down Computer correctly	a. Log in using the password b. Start and shut down the computer c. Use Mouse and Key Board	a. Login and logout as per the standard procedure b. Operate mouse &Key Board
1 (c).	To Explore Windows Desktop	a. Familiarize with Start Menu, Taskbar, Icons and Shortcuts b. Access application programs using Start menu, Task manager c. Use Help support	a. Access application programs using Start menu b. Use taskbar and Task manager
2.	To check the software details of the computer	a. Find the details of Operating System being used b. Find the details of Service Pack installed	Access the properties of computer and find the details
3.	To check the hardware present in your computer	a. Find the CPU name and clock speed b. Find the details of RAM and Hard disk present c. Access Device manager using Control Panel and check the status of devices like mouse and key board d. Use My Computer to check the details of Hard drives and partitions e. Use the Taskbar	a. Access device manager and find the details b. Type /Navigate the correct path and Select icon related to the details required

4.	Working with Files and Folders Working with Files and Folders Continued....	a. Create folders and organizing files in different folders b. Use copy / paste move commands to organize files and folders c. Arrange icons – name wise, size, type, Modified d. Search a file or folder and find its path e. Create shortcut to files and folders (in other folders) on Desktop f. Familiarize with the use of My Documents g. Familiarize with the use of Recycle Bin	a. Create files and folders Rename , arrange and search for the required folder/file b. Restore deleted files from Recycle bin
5.	To use Windows Accessories: Calculator – Notepad – WordPad – MS Paint	a. Familiarize with the use of Calculator b. Access Calculator using Run command c. Create Text Files using Notepad and WordPad and observe the difference in file size d. Use MS paint and create .jpeg, .bmp files using MS Paint	a. Use windows accessories and select correct text editor based on the situation. b. Use MS pain to create /Edit pictures and save in the required format.
6.	To familiarize with Ribbon layout of MS word. – Home – Insert- page layout- References-Review-View	a. Create/Open a document b. Use Save and Save as features c. Work on two documents simultaneously d. Choose correct Paper size and Printing options	a. Create a Document and name appropriately and save b. Set paper size and print options
7.	To practice Word Processing Basics	a. Typing text b. Keyboard usage c. Use mouse (Left click / Right click / Scroll) d. Use Keyboard shortcuts e. Use Find and Replace features in MS- word f. Use Undo and Redo Features g. Use spell check to correct Spellings and Grammar	a. Use key board and mouse to enter/edit text in the document. b. Use shortcuts c. Use spell check/ Grammar features for auto corrections.
8.	To practice Formatting techniques	a. Formatting Text b. Formatting Paragraphs c. Setting Tabs d. Formatting Pages e. The Styles of Word f. Insert bullets and numbers g. Themes and Templates h. Insert page numbers, header and footer	a. Format Text and paragraphs and use various text styles. b. Use bullets and numbers to create lists c. Use Templates /Themes d. Insert page numbers date, headers and footers
9.	To insert a table of required number of rows and columns	a. Edit the table by adding the fields – Deleting rows and columns – inserting sub table –marking borders. Merging and splitting of cells in a Table b. Changing the background colour of the table c. Use table design tools d. Use auto fit – fixed row/ column height/length – Even distribution of rows / columns features e. Convert Text to table and Table to Text f. Use Sort feature of the Table to arrange data in ascending/descending order	a. Insert table in the word document and edit b. Use sort option for arranging data.
10.	To Insert objects, clipart and Hyperlinks	a. Create a 2-page document. &Insert hyperlinks and Bookmarks. b. Create an organization chart c. Practice examples like preparing an Examination schedule notice with a hyperlink to Exam schedule table.	a. Insert hyperlinks &Bookmarks b. Create organization charts/flow charts

11	To Use Mail merge feature of MS Word	a. Use mail merge to prepare individually addressed letters b. Use mail merge to print envelopes.	Use Mail merge feature
12.	To use Equations and symbols features.	a. Explore various symbols available in MS Word b. Insert a symbol in the text c. Insert mathematical equations in the document	Enter Mathematical symbols and Equations in the word document
13.	To Practice with MS-EXCEL	a. Open /create an MS Excel spreadsheet and familiarize with MS Excel 2007 layout like MS office Button- b. Use Quick Access Toolbar- Title Bar-Ribbon-Worksheets- Formula Bar-Status Bar	a. Familiarize with excel layout and use b. Use various features available in toolbar
14.	To access and Enter data in the cells	a. Move Around a Worksheets-Quick access -Select Cells b. Enter Data-Edit a Cell-Wrap Text-Delete a Cell Entry-Save a File-Close Excel	a. Access and select the required cells by various addressing methods b. Enter data and edit
15.	To edit spread sheet Copy, Cut, Paste, and selecting cells	a. Insert and Delete Columns and Rows-Create Borders-Merge and Center b. Add Background Color-Change the Font, Font Size, and Font Color c. Format text with Bold, Italicize, and Underline-Work with Long Text-Change a Column's Width	Format the excel sheet
16.	To use built in functions and Formatting Data	a. Sort and filter data in a worksheet b. Perform Mathematical Calculations verify -AutoSum c. Perform Automatic Calculations-Align Cell Entries	Use built in functions in Excel
17.	To enter a Formula for automatic calculations	a. Enter formula b. Use Cell References in Formulae c. Use Automatic updating function of Excel Formulae d. Use Mathematical Operators in Formulae e. Use Excel Error Message and Help	Enter formula for automatic calculations
18.	To Create Excel Functions, Filling Cells	a. Use Reference Operators b. Work with sum, Sum if , Count and Count If Functions c. Fill Cells Automatically	a. Create Excel sheets involving cross references and equations b. Use the advanced functions for conditional calculations
19.	To Practice Excel Graphs and Charts	a. Produce an Excel Pie Chart b. Produce Excel Column Chart	a. Use data in Excel sheet to Create technical charts and graphs Produce Excel Line Graph b. Produce a Pictograph in Excel
20.	To format a Worksheet in Excel, page setup and print	a. Shade alternate rows of data b. Add currency and percent symbols c. Change height of a row and width of a column d. Change data alignment e. Insert Headers and Footers f. Set Print Options and Print	a. Format Excel sheet b. Insert headers &footers and print
21.	To familiarize with Ribbon layout &features of PowerPoint 2007.	Use various options in Home, insert , design, animation , slideshow, Review &View in the PowerPoint	c. Access required options in the tool bar
22.	To create a simple PowerPoint Presentation	a. Insert a New Slide into PowerPoint b. Change the Title of a PowerPoint Slide	a. Create simple PowerPoint presentation with photographs/ClipArt and text

		c. PowerPoint Bullets d. Add an Image to a PowerPoint Slide d. Add a Textbox to a PowerPoint slide	boxes Use bullets option
22.	To create a simple PowerPoint Presentation	e. Insert a New Slide into PowerPoint f. Change the Title of a PowerPoint Slide g. PowerPoint Bullets h. Add an Image to a PowerPoint Slide e. Add a Textbox to a PowerPoint slide	b. Create simple PowerPoint presentation with photographs/ClipArt and text boxes Use bullets option
23.	To Set up a Master Slide in PowerPoint and add notes	a. Create a PowerPoint Design Template b. Modify themes c. Switch between Slide master view and Normal view d. Format a Design Template Master Slide e. Add a Title Slide to a Design Template i. The Slide Show Footer in PowerPoint d. Add Notes to a PowerPoint Presentation	a. Setup Masterslide and format Add notes
24.	To Insert Text and Objects	a. Insert Text and objects b. Set Indents and line spacing c. Insert pictures/ clipart d. Format pictures e. Insert shapes and word art f. Use 3d features f. Arrange objects	Inset Text and Objects Use 3d features
25.	To insert a Flow Chart / Organizational Charts	a. Create a Flow Chart in PowerPoint b. Group and Ungroup Shapes Use smart art	c. Create organizational charts and flow charts using smart art
26.	To insert a Table	a. PowerPoint Tables b. Format the Table Data c. Change Table Background c. Format Series Legend	c. Insert tables and format
27.	To insert a Charts/Graphs	a. Create 3D Bar Graphs in PowerPoint b. Work with the PowerPoint Datasheet c. Format a PowerPoint Chart Axis d. Format the Bars of a Chart d. Create PowerPoint Pie Charts e. Use Pie Chart Segments f. Create 2D Bar Charts in PowerPoint g. Format the 2D Chart g. Format a Chart Background	c. Create charts and Bar graphs, Pie Charts and format.
28.	To Insert audio &video, Hyper links in a slide Add narration to the slide	a. Insert sounds in the slide and hide the audio symbol b. Adjust the volume in the settings c. Insert video file in the format supported by PowerPoint in a slide d. Use automatic and on click options e. Add narration to the slide Insert Hyperlinks	a. Insert Sounds and Video in appropriate format. b. Add narration to the slide c. Use hyperlinks to switch to different slides and files
29.	To Practice Animation effects	a. Apply transitions to slides j. To explore and practice special animation effects like *Entrance, Emphasis, Motion Paths &Exit*	c. Add animation effects
30.	Reviewing presentation	a. Checking spelling and grammar b. Previewing presentation c. Set up slide show d. Set up resolution e. Exercise with Rehearse Timings feature in PowerPoint f. Use PowerPoint Pen Tool during slide show g. Saving h. Printing presentation (a) Slides (b) Handout	a. Use Spell check and Grammar feature b. Setup slide show c. Add timing to the slides b. Setup automatic slide show